INTIMATE PARTNER VIOLENCE, HIV, VIRAL HEPATITIS AND STI AND KNOWLEDGE ABOUT TRANSMISSION MODES AMONG PREGNANT WOMEN IN NAMPULA, MOZAMBIQUE: RESULTS FROM A CROSS-SECTIONAL STUDY.

EUSÉBIO EUGÉNIO CHAQUISSE

TESE DE DOUTORAMENTO EM MEDICINA

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Dedication

I have fulfilled my desire with the help of my wife Arlinda, my daughter Shelcia Shannay and my son Stanley. This doctoral degree is dedicated to them with love and gratitude

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LIST OF ABBREVIATIONS AND ACRONYMS

AFP	Alpha-fetoprotein
AIDS	Acquired Immunodeficiency Syndrome
ALT	Alanine aminotransferase
Anti-HBc	Hepatitis B core antibody
Anti-HCV	Antibodies to Hepatitis C Virus
ART	Antiretroviral Therapy
ASRH	Adolescent Sexual and Reproductive Health
BIC	Bayesian Information Criterion
CD4	The Immunologic cells which have a receptor on the outside that allows HIV to bind with the cells.
CTS	Conflict Tactics Scales
DFC	Danida Fellowship Centre
DFC	Danida Fellowship Center
DH	Day Hospital
DNA	Deoxyribonucleic Acid
EP2	Highest Primary Level
FDG	Focus Group Discussion
FTA-ABS	Fluorescent Treponemal Antibody Absorption
GNP	Gross National Product
HBeAg	Hepatitis B e Antigen
HBsAg	Hepatitis B surface Antigen
HBV	Hepatitis B Virus
HCC	Hepatocellular carcinoma
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
HLA	Human Leukocyte Antigen
IPV	Intimate partner violence
LCM	Latent Class Models
MISAU	Ministério da Saúde (Ministry of Health
NGO's	Non-Governmental Organization
NHS	National Health Services
PEN	Plano Nacional Estratégico (National Strategic Plan)
PMTCT	Prevention of Mother to Child Transmission
RNA	Ribonucleic Acid
RPR	Rapid Plasma Reagin
STI	Sexually Transmitted Infections
TDF	Tenofovir
TPHA	Treponema Pallidum Haemaglutination
TPPA	Treponema Pallidum Agglutination
UNAIDS	Joint United Nations Programme on HIV/AIDS
VCT	Voluntary and Counselling Testing
YFS	Youths Friendly Services

ABSTRACT

Introduction: Mozambique is one of the countries most affected by the AIDS epidemic in the world, with an HIV prevalence of 11.5% in the 15-49 year age group. HIV is associated with a higher prevalence of both Hepatitis B (HBV) and Hepatitis C (HCV). In sub-Saharan Africa, co-infection with HIV and HBV and syphilis is highly prevalent and these infections can be transmitted from mother to child and may cause severe morbidity in their offspring. Contributing factors to the current high rates of HIV and HBV include abuse and violence, gender inequalities, unequal access to education and lack of economic opportunities. Intimate partner violence (IPV) is a major public health problem worldwide but research on IPV in Africa, including Mozambique, remains limited. The prevalence of sexual and physical intimate partner violence against women is high in the majority of sub-Saharan African countries.

Methods: The research was cross-sectional, carried out in six health units in Nampula Province, Mozambique, from February 2013 to January 2014. One in every three pregnant women who visited primary health facilities for the first prenatal appointment was eligible and invited to participate. In total, 1440 pregnant women were invited to participate and 1216 (84.4%) agreed to participate. A similar sampling procedure was performed for all HIV and AIDS patients attending antiretroviral clinics. A total of 761 were invited to participate and 742 (97.5%) agreed to participate. After considerable losses during transport, 666 (54.8%) and 279 (40.3%) plasma samples were available for laboratory analysis, from pregnant women and HIV positive patients, respectively. Interviews were conducted using structured questionnaires on demographic variables, IPV and knowledge, and attitudes regarding selected infectious diseases. Only 869 pregnant women were able to answer the Conflict Tactics Scale 2 (CTS2) for IPV. The Chi-square test was used to compare proportions, with significance tested using a p-value of < 0.05. Odds ratios (OR) and respective 95% confidence intervals (95%CI) were calculated. Logistic regression was used to estimate the association of sexual and physical abuse with covariates, adjusting for the potential confounders. The data analysis was performed using the statistical software SPSS, version 22. To evaluate the knowledge and attitudes among pregnant women, Latent Class Models (LCM) was used to identify specific groups in terms of knowledge about HIV, HBV and HCV modes of transmission. Thus, class 1 was represented by women with a high proportion of correct answers, therefore, high knowledge; class 2 was represented by women who gave almost half of the correct responses without misconceptions and class 3 was represented by women who gave a lower proportion

of correct answers and misconceptions. Solutions with 1, 2 and 3 classes were tested from which we chose the one that showed the smallest Bayesian Information Criterion (BIC). The comparisons of proportions by latent classes were performed using the Chi-square test or Fisher's exact test, with a p-value of < 0.05, between groups.

The prevalence of HIV infection was 30.3%, 40 women (6.2%) had chronic Hepatitis B and 451 (69.9%) had had a previous Hepatitis B infection, 4 (0.9%) had Hepatitis C and 3 (0.5%) had Syphilis. Among the 201 HIV-positive women, 29 (14.4%) were aware of their infection and 17 (58.6%) were under treatment. There were no differences between the two groups regarding condom use in the last sexual intercourse.

The prevalences of HIV, HBV, HCV and syphilis co-infection were measured on sera samples, which suffered considerable losses during transport. For the study were used 638 and 277 sera samples available to perform laboratory analysis, from pregnant women and HIV positive patients, respectively. Serology for HIV, hepatitis B (HBsAg, HBeAg, anti-HBc), hepatitis C (anti-HCV) and syphilis was performed using standard laboratory procedures and algorithms. Statistical analyses were performed using SPSS software for Windows, version 22.0 using a p-value of <0.05 for significance.

Results: Sexual abuse and physical violence occurred in every age group. The prevalence of lifetime sexual abuse was 49% and of physical abuse was 46%. During the past year, the prevalence was 46% and 44% for sexual and physical abuse, respectively. Significant associations were found between previous neonatal deaths and being physically abused, during the lifetime (OR= 3.00, 95% IC: 1.67 to 5:39), and the past year (OR=3.23, 95% CI: 1.80 to 5.80)

The distribution of women in each class for knowledge regarding HIV was 687 (60.5%), 295 (26.0%) and 154 (13.6%), in class 1, 2 and 3, respectively. For HBV knowledge, the distribution was 274 (23.6%), 149 (12.8%) and 738 (63.6%) for class 1, 2 and 3, respectively. For HCV, the knowledge distribution was: class 1, 214 (18.4%); class 2, 146 (12.6%) and class 3, 801 (69.0%).

Among pregnant women, the prevalence of HIV infection was 30.3%, 40 women (6.2%) had chronic Hepatitis B and 451 (69.9%) had had a previous Hepatitis B, 4 (0.9%) had Hepatitis C and 3 (0.5%) had Syphilis infection. Among the 201 HIV- positive women, 29 (14.4%) were aware of their infection and 17 (58.6%) were under treatment. The prevalence of HIV/HBsAg+, HIV/anti-HCV and HIV/syphilis co-infection, were 3.6%, 0.2% and 0.5%, respectively. There

were no differences between women who were previously aware of their HIV positive status and those who were not aware, regarding condom use in the last sexual intercourse (P >0.5).

Conclusion: The prevalence of intimate partner violence is very high among women in this study. Contact with women in prenatal care provides a window of opportunity for identifying women who experience violence and screening for sexually transmitted infections. Latent class models (LCM) showed a high knowledge of HIV modes of transmission, but that of HBV and HCV was little known. In this setting, HBV may also have been transmitted horizontally in children, and screening for HBsAg among pregnant women could contribute substantially to avert the negative impact on morbidity and mortality especially for HIV/HBV coinfected individuals.

Resumo:

Introdução: Moçambique é um dos países mais afetados pela epidemia do SIDA, no mundo, com uma prevalência de VIH de 11,5% no grupo etário dos 15-49 anos. O VIH está associado a uma maior prevalência de Hepatite B (VHB) e Hepatite C (VHC). Na África Subsaariana, a coinfecção por VIH e VHB e sífilis é altamente prevalente e estas infeções podem ser transmitidas de mãe para o filho e pode causar morbidade grave em sua prole. Fatores que contribuem para as atuais altas taxas de VIH e VHB incluem abuso e violência, as desigualdades de género, acesso desigual à educação e à falta de oportunidades económicas. Violência por Parceiro Íntimo (IPV) é um importante problema de saúde pública em todo o mundo, mas as pesquisas sobre IPV em África, incluindo Moçambique continua a ser limitado. A prevalência de violência por parceiro íntimo sexual e física contra as mulheres, na maioria dos países da África Subsaariana é alta.

Métodos: A pesquisa foi transversal, realizado em seis unidades de saúde na província de Nampula, Moçambique, a partir de fevereiro de 2013 a janeiro de 2014. Uma em cada três mulheres grávidas que foram as consultas pré-natais, no Centro de Saúde, para a primeira consulta pré-natal era elegível e convidados a participar. No total, 1440 mulheres grávidas foram convidados a participar e 1.216 (84,4%) concordaram em participar da entrevista, Um procedimento de amostragem similar foi realizado para as pessoas portadoras do VIH e de SIDA que frequentaram as consultas de tratamento de tratamento antirretroviral. Assim, um total de 761 portadores de VIH e doentes de SIDA foram convidados a participar e, 742 (97,5%) concordaram em participar. Após perdas consideráveis durante o transporte, 666 (54.8%) e 279 (40.3%) amostras de plasma estavam disponíveis para análise laboratorial, de mulheres grávidas e pacientes VIH positivos, respetivamente. As entrevistas foram realizadas por meio de questionários estruturados. Apenas 869 mulheres grávidas foram capazes de responder a Conflito Tactics Scale 2 (CTS2), e o teste do qui-quadrado foi usado para comparar proporções. Significância das associações de foram testadas usando um valor de $p < 0,05$. Odds ratio (OR) e os respetivos intervalos de confiança de 95% (IC95%) foram calculados. A regressão logística foi usada para estimar a associação do abuso sexual e físico com covariáveis, ajustado para os potenciais fatores de confundimento. A análise dos dados foi realizada utilizando o software estatístico SPSS, versão 22. Para avaliar o conhecimento e atitude das mulheres grávidas, foi usado o Latentes Classe Models (LCM) para identificar grupos específicos em termos de conhecimento sobre o VIH, VHB e VHC modos de transmissão. Assim, a classe 1 foi representada por mulheres com uma elevada percentagem de respostas corretas, portanto, elevado conhecimento; classe 2 foi representada por

mulheres que deram quase metade das respostas corretas, sem equívocos e classe 3, foi representada por mulheres que deram uma menor proporção de respostas certas e com equívocos. Soluções com 1, 2 e 3 classes foram testadas a partir das quais escolhemos o que apresentou o menor Critério de Informação Bayesiana (BIC). As comparações de proporções por classes latentes foram realizadas utilizando o teste do qui-quadrado ou teste exato de Fisher, nível de significância foi testada usando o valor de p <0,05, entre os grupos.

As prevalências das infeções por VIH, VHB e VHC e sífilis e, coinfecções foram medidas através de amostras de plasma, que parte delas foram perdidas durante o transporte. Para o estudo foram feitos testes laboratoriais de 638 e 277 amostras de plasma de mulheres grávidas e pacientes VIH positivos, respetivamente. As serologias para o VIH, hepatite B (HBsAg, HBeAg, anti-HBc), hepatite C (anti-VHC) e sífilis foram realizadas utilizando procedimentos padronizados de laboratório e algoritmos. As análises estatísticas foram realizadas utilizando software SPSS para Windows, versão 22.0 usando um valor de p <0,05 para significância estatística.

Resultados: O abuso sexual e a violência física ocorreram em todas as faixas etárias. A prevalência de abuso sexual durante a vida foi de 49% e de abuso físico foi de 46%. Durante o ano passado, a prevalência foi de 46% e 44% para o abuso sexual e físico, respetivamente. Foram encontradas associações significativas entre os óbitos neonatais anteriores e tendo sido abusadas fisicamente, durante ao longo da vida da mulher (OR = 3,00, 95% IC: 1,67 a 5:39), e no ano passado (OR = 3,23, 95% CI: 1,80-5,80).

A distribuição das mulheres em cada uma das classes do conhecimento sobre VIH foi 687 (60,5%), 295 (26,0%) e 154 (13,6%), pertencentes à classe 1, 2 e 3, respetivamente. Para o conhecimento do HBV, a distribuição foi de 274 (23,6%), 149 (12,8%) e 738 (63,6%) para as classes 1, 2 e 3, respetivamente. Para o HCV, o conhecimento foi distribuído nas seguintes classes 1, 214 (18,4%); classe 2, 146 (12,6%) e classe 3, 801 (69,0%).

Entre as mulheres grávidas, a prevalência da infeção pelo VIH foi de 30,3%, 40 mulheres (6,2%) tinham hepatite B crónica e 451 (69,9%) tiveram infeção pela Hepatite B, 4 (0,9%) tiveram hepatite C e 3 (0,5%) infeção pela sífilis. Entre as 201 mulheres VIH-positivas, 29 (14,4%) estavam cientes da sua infeção e 17 (58,6%) estavam em tratamento. A coinfecção por VIH/HBsAg +, VIH/anti-VHC e VIH/sífilis, foi de 3,6%, 0,2% e 0,5%, respetivamente. O uso do preservativo na última relação sexual, o estudo não encontrou nenhuma diferença entre o

grupo de mulheres que sabia previamente o seu estado serológico positivo em relação ao VIH, do das que não sabia o seu estado serológico antes da consulta (P >0.5).

Conclusão: A prevalência de violência da mulher pelo parceiro íntimo é muito alta entre as mulheres, neste estudo e, as consultas pré-natais podem ser uma janela de oportunidade para identificar as mulheres que sofreram violência e rastreio de infeções sexualmente transmissíveis. O Modelo Latente de Classes (LCM) mostrou um alto conhecimento sobre os modos da transmissão do VIH, seguido pelo VHB e por fim o VHC. O estudo também revelou que, deve ser considerada a transmissão do vertical do VHB e, o rastreio do HBsAg em mulheres grávidas pode contribuir substancialmente para reduzir o impacto negativo destas doenças na morbilidade e mortalidade em particular de indivíduos coinfetados pelo VIH/VHB, bem como da transmissão vertical do VHB.

1. INTRODUCTION

The Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) epidemic continues to be a cause for concern worldwide. In 2014, estimates showed that 36.9 million people were living with HIV and AIDS. Only in 2014, about 2 million new people were infected with HIV and the number of deaths related to AIDS illness 1.2 million people worldwide (1). In sub-Saharan Africa, there are 24 million people living with HIV (2). Since 2000, about 38.1 million people have become infected by HIV and 25.3 million people have died of AIDS (1). In 2012 there were an estimated 35.3 million people living with HIV and AIDS worldwide, and globally there were 2.3 million new infections, showing a 33% decline in the number of new infections from 3.4 million in 2001 (3). Sub-Saharan Africa continues to be the part of the world hardest hit by the HIV pandemic (4). Mozambique is one of the countries most affected by the epidemic, with an HIV prevalence of 11.5% in the 15-49 year age group (5, 6).

Globally, estimates show that of all people living with HIV worldwide, about 2 million - 4 million also have Hepatitis B Virus (HBV) infection and 4 million – 5 million people Hepatitis C virus (HCV) infection (2). HIV is associated with a higher prevalence of both HBV and HCV in sub-Saharan Africa, a systematic review and meta-analysis of people infected with HIV showed Hepatitis B surface Antigen (HBsAg) and antibodies to Hepatitis C Virus (anti-HCV) prevalence of 15% and 7%, respectively. The risk ratios (RRs) for being HBsAg positive and anti-HCV positive were 1,40 (95% Confidence Interval (CI) 1.16-1.69) and 1.60 (95% CI 1.05-2.45) in HIV-infected, as compared to HIV-uninfected, patients (7). Hepatitis B virus, HIV-1, and Treponema pallidum represent major public health problems in sub-Saharan Africa. These infections can be transmitted from mother to child and may cause severe morbidity in their offspring. Co-infection with HIV-1 and HBV and syphilis is highly prevalent and far from negligible among antenatal care attendees and Individuals Attending Centres for screening sexually transmitted infections (8, 9). Shared transmission paths mean that co-infection with HIV, HBV, HCV, and syphilis constitute a joint public health problem (10-12).

An estimated 350 million people are chronically infected with HBV and are at risk of developing hepatocellular carcinoma (HCC), with over 2 billion individuals being exposed to the virus (13). Chronic infection with HBV is the most frequent cause of this type of a tumor, representing more than 50% of global cases. In HCC endemic regions, this number rises to almost 70 - 80% of the cases, becoming the sixth most common type of cancer today. The incidence of HCC among individuals with chronic HBV infection ranges from 400 to 800 in males and from 120 to 180 in females, per 100.000 persons/year. It occupies third place in annual cancer mortality rates. Approximately 80% of HCCs cases occur in developing countries in regions such as the Asia-Pacific and Sub-Saharan Africa where HBV infection is endemic and has a high incidence (14, 15).

In Africa, about 50 million people are a chronic carrier of HBV, with 25% of mortality risk. The sub-Saharan Africa countries are in a high endemicity region with HBsAg carrier rates between 9 – 20% (16).

HBV infection is acquired during the prenatal period, at birth or during the first months or years of life. Frequently infection becomes chronic. The risk of developing HCC is higher in the presence of cirrhosis, obesity and diabetes mellitus, and co-infection with hepatitis C virus. Factors associated with a high risk of HCC include demographic (male sex and age), lifestyle (alcoholism and smoking), viral (genotype C, D, and F, elevated level of HBV-DNA, nucleus/mutation pre-core) and clinical liver cirrhosis, elevation of alpha-fetoprotein (AFP), and alanine aminotransferase (ALT) characteristics. Although the incidence of chronic hepatitis B has been falling as a result of universal infant immunization, the incidence of HBV induced HCC will increase for about two more decades. HCC related to HBV has a bad prognosis with average survival below 16 months (14, 15, 17-21).

Approximately 6-10% of individuals infected with HIV are more likely to be infected with HBV, an estimated 2.5 to 3 million people. Studies show that HIV infection impacts negatively on the evolution of hepatitis, resulting in a higher rate of chronicity of HBV after acute infection, by increasing the replication rate of DNA-HBV and exacerbates fibrosis, a lower rate of Hepatitis B e Antigen (HBeAg) seroconversion and a higher percentage of occult infections, which presents serious problems for diagnosis, prevention and control. The presence of co-infection also worsens the outcome of HBV infection treatment (22, 23).

It has been demonstrated that HLA-A (Human Leucocytes Antigen -A) genotype is dominant in mediating control of HBV DNA, predicting HBeAg-positive status. This finding supports the role of CD8+ T cell response in HBV control. The relationship was not significant for HLA-B or HLA-C alleles, the other two human types of Major Histocompatibility Complex (MHC) class I (24).

About 25% (10 million) of HIV infected patients are estimated to also be infected with the Hepatitis C Virus (HCV). There is no consensus about the negative effect of HIV infection on the evolution of hepatitis caused by HCV. Nevertheless, it possibly increases RNA HCV by accelerating the progression of fibrosis and increasing the rate of chronicity of HCV, thereby facilitating the sexual and vertical transmission of the virus (22).

In many countries worldwide chronic liver disease caused by infection with HBV and/or HCV in HIV-infected patients is common, making it one of the causes of morbidity and mortality among HIV-infected people. The co-infection in HIV patients with HCV is particularly high in areas where intravenous drug use is high (25, 26).

The prevalence of HCV infection in pregnant women is estimated to be between 1 and 8%, in children between 0.05% and 5%, worldwide. Parenteral transmission is still common in children living in developing countries and HIV co-infection is associated with increased

transmission. In developed countries, perinatal transmission is now the leading cause of HCV transmission (27).

The absence of an HCV vaccine or approved therapy during pregnancy means that prevention of vertical transmission is still not possible. However, a low vertical transmission rate of 3-5%, a high rate of spontaneous clearance (25-50%) and delayed morbidity have resulted in HCV being overlooked in pregnant women and their infants. Factors known to increase the risk of perinatal transmission include HIV co-infection and higher maternal viral loads. Current guidelines for the diagnosis of persistent perinatal infection require a positive anti-HCV test in infants born to infected mothers after 12 months or two positive HCV RNA tests at least 6 months apart (27, 28).

Syphilis is a major public health problem in sub-Saharan Africa, a study conducted among pregnant women, found a high prevalence of syphilis and coinfection of HIV/Syphilis the rate was high. The prevalence of syphilis and HIV has been shown to vary by time period, geographic area and study population (12, 29-32). Untreated syphilis during pregnancy is associated with the incidence of adverse pregnancy outcomes such as congenital syphilis, stillbirth, miscarriage, neonatal death and low birth weight (33) The risk for syphilis infection is significantly higher among women with more than 3 previous pregnancies and those attending semi-urban and rural clinics (34).

In Mozambique, a study conducted in 1578 replacement blood donors in Maputo Central Hospital, showed an HBsAg seroprevalence in men and women, of 10.6% and 4.5%, respectively, and an Anti-HCV seroprevalence of 1.2% and 1.0 %, respectively (35). Another study, conducted in four rural clinics in northern Mozambique among HIV positive individuals, revealed a prevalence of 7.6% HBsAg-positive. (36). An earlier study conducted on 428 Mozambican refugees in South Africa for markers of exposure of HBV and HCV, showed that

56% of the population had anti-HBsAg, while 13.2% were also HBeAg positive and 3.2% were anti-HCV positive (37).

The risk of HCV infection remains very low in Mozambique. In a recent study among voluntary and replacement blood donors, in the Provincial Hospital of Tete, no HCV infection was found. Prevalence for infection by HIV, HBsAg and syphilis were 8.5%, 10.6% and 1, 2%, respectively (38).

From the beginning of the HIV epidemic, Mozambique developed strategic plans that included prevention strategies. Priorities include the treatment of opportunistic diseases and AIDS disease manifestations (39), taking into account the criteria of the World Health Organization (WHO) on access to antiretroviral treatment, and assuming the limitations of human, financial and responsiveness of the National Health System (40).

A study conducted among pregnant women, in Nigeria, showed a high prevalence of HIV, HBV and HIV-HBV co-infection. Widowed/divorced women had a higher prevalence of HIV, HBV infection ($P<0.001$), and more educated women had a lower prevalence of HBV infection. The rates of co-infection were higher among students as compared to other occupations (41). HIV plays an important role on HBV transmission: a study conducted in Mozambique and Zambia among HIV positive individuals, showed high median HBV viral loads, and CD4 cells count below 200/µl, HBeAg-positivity was associated with high HBV DNA (>20,000 IU/ml), and genotypes A1 (58.8%) and E (38.2%) were most prevalent (36).

Mother-to-child transmission (MTCT) of HCV is not a major route of HCV transmission. In a study conducted in Cameroon 68 (76%) out of 89 ant-HCV positive pregnant women were HCV-RNA positive. Genotype 4 was predominant (43%), followed by genotypes 1 (28.1%) and 2 (26.6%). Among 35 women who delivered 36 live children, none of those screened at 6 weeks and 6 months were HCV-RNA positive (42). Although the influence of HIV and HCV co-

infection depends on the CD4 counts, with a relative risk for the development of cirrhosis of about two, HBV/HCV co-infection is uncommon the co-infected patients have a higher risk of developing HCC than those who are only infected with one virus (43).

In 2009, an estimated 370 000 children [220 000 – 520 000] contracted HIV during the perinatal and breastfeeding period, although these numbers have shown a diminution in the number of infected children compared with the year 2001. In 2010, UNAIDS began a campaign for the virtual elimination of mother to child transmission of HIV by 2015, in the 10 most severely affected countries. They considered this to be a realistic aim, which could be achieved with a significant increase in the implementation of proven strategies to eliminate HIV transmission to children (44).

Intimate partner violence (IPV) is a major public health problem in Africa and worldwide (45). A systematic review of African studies on IPV during pregnancy has shown a prevalence range from 2% to 57% (46). Women account for a rising percentage of all HIV cases, with husbands' risky behavior described as the major source of women's infection. Women who have experienced physical abuse during pregnancy have an increased risk of preterm delivery, independently of a large set of behavior and sociodemographic characteristics, recognized as associated factors for preterm birth (47). Furthermore, women who are taking antiretroviral drugs for HIV treatment are more likely to suffer any type of intimate partner violence (physical, sexual or psychological) (48-51). In rural Uganda, almost one in three women living with HIV had suffered intimate partner violence in the preceding 12 months. Nearly one in five HIV patients reported physical violence, and about one in every seven HIV patients reported sexual/psychological violence (48). A similar pattern was also reported in Rwanda, where HIV positive participants were more than twice as likely to report physical IPV compared to those who were HIV negative (52). These findings highlight the interaction between gender inequality, domestic violence and HIV infection (53). Moreover, a systematic review of studies

conducted in Africa has shown a significant association between HIV and IPV during pregnancy (54).

A cohort study in South Africa showed that 13.9% of incident HIV infection could be averted if women were not in a relationship of low power and 11.9% of new HIV infection could be averted if women did not experience more than one episode of physical or sexual partner violence (55). Cohort studies of incident HIV/Sexual Transmitted Infections (STI) have found an increased risk of HIV/STI among women exposed to IPV (56).

A gender-related vulnerability has been recognized as a key aspect contributing to the increased propensity for women to contract HIV. Negotiations surrounding sexual activity are characterized by multiple power disparities that include race, social status, and age, with gender being the most dominant differential in heterosexual interactions. This pressure and coercion or manipulation is felt by women in interactions either with older men or in their romantic partnerships. Some of their counterparts experienced pressure to engage in sexual intercourse with their boyfriends when they were unwilling or unready, and they reported being faced with additional pressure to engage in unprotected sex (57). A community cohort study in Uganda showed that risk factors for physical or sexual violence, include younger age, being married, relationships of shorter duration, having a partner who is the same age or younger, alcohol use before sex by women and by their partners, and thinking that violence is acceptable. Nonetheless, HIV infection and pregnancy were not associated with increased odds of IPV (58). In Zimbabwe, the rates of IPV during pregnancy are among the highest ever reported globally (59).

The WHO review identified risk factors for IPV and classified them into four levels of an ecological framework: individual, relationship, community and societal levels factors (60). Individual-level factors are younger age, lower socio-economic status, lower levels of education, separation or divorce, pregnancy, exposure to intra-parental violence in childhood,

sexual abuse, depression, harmful use of alcohol or illicit drugs, acceptance of violence, and exposure to prior abuse or victimization. Relationship level factors are an educational disparity, a greater number of children, and marital dissatisfaction or discord. Community level factors are acceptance of traditional gender roles, unemployment, poverty, a high female illiteracy rate, acceptance of violence, a low proportion of women with high level of autonomy, a low proportion of women with higher education, and weak community sanctions (i.e. communities) which lack legal sanctions and where women lack access to shelters and family support, and in which there is less moral pressure for neighbours to intervene if a woman is beaten). Societal level factors are divorce regulations, a lack of legislation on IPV within marriage, protective marriage laws, and traditional gender and social norms (60, 61).

Syphilis and IPV disproportionally affect women and may be associated. A study conducted in Bolivia showed that 20.4% of women who reported IPV had a positive Syphilis test, compared to 4% in women who did not report IPV (46).

Routine antenatal HBV screening should be offered in HIV/HBV endemic regions, especially for HIV-positive pregnant women, to allow the identification of neonates who are in need of HBV passive immunoprophylaxis at birth. This strategy, together with antenatal antiretrovirals, will contribute to reducing the risk of perinatal HBV transmission (62). To reduce the risk of infection of the mothers, the appropriate emphasis should be given to increasing awareness and intensive public health education about the horizontal transmission HBV (63, 64). In Mozambique a report from the National Health System (NHS), the percentage of women with at least one prenatal consultation had been increasing in recent years, reaching 91% of pregnant women, in 2012 (65).

2. STUDY RATIONALE

Mozambique is among the 10 countries with the highest prevalence of HIV and number of AIDS patients (2). With the expansion of antiretroviral therapy, AIDS has increasingly become a chronic disease, rather than a cause of death. People infected with HIV now have increased life expectancy and quality of life of. Expanding access to ART is part of government policy in Mozambique, it can be sustained by the Ministry of Health approval of a new therapy that introduced Tenofovir (TDF), a drug with effective action for the treatment of HBV co-infection (40).

Global Knowledge regarding the prevention of HIV transmission has increased, condom use has risen amongst people with multiple sexual partners and the proportion of young people who have received an HIV test and learned their results has also increased. Countries now also have the potential to reach at least 90% of pregnant women living with HIV with antiretroviral interventions by 2015 (66).

MTCT of HIV infection continue to be a major public health problem and is the most important cause of HIV infection in children under the age of 15 years old, hence, strengthening the level of PMTCT services in ANC settings and devising mechanisms to promote involvement of men in PMTCT services is needed to increase the low awareness and knowledge on timing of MTCT of HIV (67). Prevention of MTCT of HBV continues to be a challenge in most SSA countries, where more than 8% of the population remain chronic carriers of HBV, despite the implementation of HBV birth-dose vaccination. The HBV vaccine coverage remains low (68).

The efficiency of HIV transmission male-to-female is 2.3 times greater than female-to-male transmission, during the sexual intercourse, are possible reasons for the difference in efficiency of transmission (69, 70). The involvement of men in antenatal care could potentially prevent women from acquiring HIV infection during pregnancy and post-partum when they are

more vulnerable and have a high risk of transmission to the infant. (71). Pregnant women need to be informed of their increased risk of HIV, HBV, the importance of reduction of sexual activity during pregnancy and the need to use condoms throughout pregnancy and identifying the significant challenges to implementation of either HIV and/or HBV prevention programs, especially during antenatal visits (68, 71, 72).

Syphilis is a public health problem in Mozambique, studies conducted among pregnant women and STD patients, from 1985 to 2000, the prevalence varied from 4.5% to 15% (73-76). A National Antenatal HIV and Syphilis Surveillance Survey found, in 2011, a national syphilis prevalence of 2.2% and in the northern region of the country the prevalence was 8.2% (77).

Due to the shared route of transmission for HIV, HBV, HCV and syphilis, adequate knowledge and prevention of mother to child transmission could contribute to a reduction of the burden of HIV, HBV, HCV and syphilis infection among children (7, 33, 78).

IPV and gender inequity in relationships are associated with increased incidence of HIV in women. A cohort study of young women, in South Africa, showed that women who reported more than one episode of IPV at baseline were likely to acquired HIV (9·6 per 100 person-years) compared with 83 of 846 who reported one or no episodes (5·2 per 100 person-years). Relationship power inequity and IPV increase the risk of incident HIV infection in young women (55).

Information and communications technology are contributing dramatically to alter the ways in which people network, interact, communicate and share information. They could offer new opportunities to expand structured programs which can increase the leveraging of new information tools to improve women's health (66).

The knowledge and attitudes regarding HIV, HBV, and HCV of pregnant women in the context of Nampula are not known. The IPV among pregnant women and its various consequence still need to be investigated, to enable the health system to build up strategies which can increase the awareness among pregnant women, in Nampula, Mozambique.

3. RESEARCH QUESTIONS

1. What factors are associated with HIV, HBV, HCV and Syphilis co-infection among pregnant women, and people living with HIV, in Nampula?
2. What could be the contribution of Intimate Partner Violence (IPV) among women on HIV, HBV, HCV and Syphilis infection?

3.1. Objectives

3.1.1. General objective

To assess the knowledge of and attitudes regarding HIV, HBV, HCV and Syphilis, the prevalence of co-infection among pregnant women and people living with HIV, and the frequency of IPV in pregnant women, in Nampula city, Mozambique.

3.1.2 Specific objectives

1. To describe the frequency, dynamics and risk factors associated with intimate partner violence among pregnant women.
2. To assess knowledge and attitudes regarding HIV, HBV and HCV infection in pregnant women attending antenatal clinics.
3. To assess knowledge and attitudes regarding HIV, HBV and HCV infection in people living with HIV.
4. To assess the prevalence of HIV, HBV, HCV and Syphilis co-infection among pregnant women and HIV patients.

4. METHODS

4.1 Setting and study population

The research was cross-sectional, carried out in six urban health units in Nampula City, Mozambique, offering antenatal care services, namely the Hospital Geral de Marrere, Centro de Saúde 25 de Setembro, Centro de Saúde do Hospital Psíquiátrico, Centro de Saúde 1º de Maio, Centro de Saúde de Namicopo and Centro de Saúde de Muhala Expansão, from February 2013 to January 2014.

A sampling procedure was consisting of inviting to participate in the study, one in every three pregnant women attending the six health facilities for their first prenatal appointment. In total, 1440 pregnant women were invited to participate and 1216 (84.4%) agreed to participate. After informed consent of 1216 pregnant women, only 946 pregnant women were or have had in a relationship lasting more than 1 month and therefore eligible to answer the Conflict Tactics Scale 2 and other questions for Intimate Partner Violence (IPV). Of the 946 women, 77 were excluded from the analysis due to missing information on violence measures. Therefore, 869 women were included in the final analysis (only 40 women were not already in the relationship).

A similar sampling procedure was performed for all HIV and AIDS patients attending antiretroviral clinics. A total of 761 were invited to participate and 742 (97.5%) agreed to participate.

During transportation from Nampula to Maputo, 550 plasma samples out of the 1216 samples collected from pregnant women were lost. Thus 666 (54.8%) samples were included in the final laboratory analysis. Almost 413 plasma samples of HIV and AIDS patients were also lost, leaving 279 (40.3%) of plasma samples which were used to perform the tests of

Hepatitis B virus analysis. For Hepatitis C analysis, the samples were able to perform 235 (34.0%).

In each health facility, nurses for maternal and child health, health officer and university students were trained to conduct the interviews using a structured questionnaire. After training the nurses, health officer and university students carried out a pilot study, which allowed further familiarization with the questionnaire, as well as harmonizing the flow of questions.

Collection of Blood samples

The blood samples were collected using the current procedures at health units, established by the National Health Services (NHS). All were analyzed following standard procedures for laboratory tests. Analyses that were not part of the routine (hepatitis B and C) were performed later on the sera collected for biochemical analysis at the laboratory of the National Institute of Health, Ministry of Health.

Plasma samples of pregnant women and HIV patients were collected and kept frozen at −80°C until analysis.

4.2 Measures

Questionnaire and measurement tools

Face-to-face interviews were conducted, and data were collected using structured questionnaires administered by trained nurses, health officers, and university students, and directed to pregnant women and HIV patients. The questionnaire included questions related to sociodemographic information (age, sex, marital status, occupation, education) - use of alcohol, tobacco and illegal drugs use, sexual behavior (age at the first intercourse, number of sexual partners in the last 6 months), gestational age at the first appointment, history of neonatal deaths, and also diagnosis of sexually transmitted infections and non-prescribed pills, information on maternal health (weight, gestational age, parity and history of abortion), information on sexual health (age at 1st sexual intercourse, type of partner and condom use in

the last sexual intercourse, other sexual partners), history of non-sexual exposures to HIV, HBV, HCV, knowledge regarding HIV/AIDS, HBV, HCV modes of transmission and knowledge regarding other sexually transmitted infections (STIs), history of HIV, HBV, HCV, STI and tuberculosis. The data were double-checked for accuracy on entry to the database.

The collection of blood samples and clinical files, established by the NHS, was part of the normal procedures at health unit. The study included data on HIV test results, CD4 T cells count, serology for hepatitis B (immunoserology screening biomarker of HBsAg, HBeAg, anti-HBc, HBcAg) and hepatitis C (anti-HCV) and syphilis test, including liver transaminases, these were assessed following standard procedures, which will be described on laboratory chapter. Analyses that were not part of the routine (hepatitis B and C) were obtained using the serum collected for biochemical analysis and performed at the Nampula Central Hospital laboratory.

IPV was assessed using the conflict tactics scales (CTS2) (79). The women were asked whether they had been victims of various types of IPV. The CTS2 covers psychological aggression, physical assault, sexual coercion, physical assault with injury). The acts may have occurred once, twice, 35, 6-10, 11-20 or 20 times during the past year, had not occurred during the past year/but before or never occurred.

Data analyses

For analysis of IPV, maternal age was categorized into five categories (>18, 18-20, 21-25, 26-29, ≥30 years), education was categorized according to the Mozambique education system (no education/did not finish primary school, primary school including the first and second degree, secondary school, and pre-university and university degree), marital status was considered aggregating married or in cohabitation vs. single or separated) and occupation classified in three categories that were the most frequently reported by women: housewife or unemployed, employed or farmer, and student.

In this analysis, we only used severe or minor physical assault acts (e.g. beat up) and severe/minor sexual coercion acts (e.g. threaten to have sex) and severe/minor injury (e.g. bruises). For the present analysis, we consider that women had been abused during the past year if they disclose at least one occurrence of abuse during the past year independently of chronicity.

Information was obtained on age at first sexual intercourse (and then coded as ≤14, 15-19, >19 years), and sexual intercourse during the last 6 months, coded as Yes or No. Parity was classified as 0, 1, 2, 3, 4 or more, the gestational age at the first antenatal clinic appointment (coded as ≤14 weeks, 15-27 weeks, ≥28 weeks, roughly corresponding to trimesters), and history of neonatal deaths. Women were categorized as primigravidae, multigravidae with no neonatal deaths and multigravidae with neonatal deaths. Women were also asked about a previous diagnosis of HIV, syphilis, and gonorrhea.

Statistical analysis

All data were double-checked for accuracy on entry into the database. The Chi-square test was used to compare proportions. Significance associations were tested using a p-value < 0.05. The odds ratio (OR) and respective 95% confidence intervals (95%CI) were calculated through Logistic Regression, with adjustment for the potential confounders. The data analysis was performed using the statistical software SPSS, version 22.

Latent Class Models (LCM) was used to identify groups/patterns in terms of knowledge about HIV, HBV and HCV modes of transmission. LCM was used given the binary structure of the data. LCM solutions with 1, 2 and 3 classes were tested from which we chose the one that showed the smallest Bayesian information criterion (BIC) and the smallest Akaike's Information Criterion (AIC).

Interpretation of the model is usually done by looking at the probabilities of correct answers on each item conditional on class membership.

Comparisons of proportions by latent classes were performed using the chi-square test or Fisher's exact test, as appropriate. To test the differences between the observed and the expected cases in each cell we used the absolute adjusted residuals higher than Z1-α/2; α defined with Bonferroni correction. A significance level was fixed at 0.05. Comparisons between groups were performed using the SPSS software for Windows, version 22.0 (SPSS Inc., Chicago, Illinois, USA). LCM was performed using the software R 2.8.1, specifically the poLCA package.

4.3 Laboratory

Screening of Biomarkers for HBV

Plasma samples of HIV-infected patients and pregnant women were collected and kept frozen at −80°C until further analysis.

The immunoserology screening biomarker of HBsAg in plasma samples was measured using an immunoenzimatic 4th generation test, MP Diagnostics HBsAg ELISA 4.0, according to the manufacturer's procedures (MP Biomedicals Asia Pacific Pte Ltd, Singapore). The immunoserology diagnosis of biomarker HBeAg in plasma samples was performed using an enzyme immunoassay 4th generation test, 4.0 MP Diagnostic HBeAg ELISA, following the procedures indicated by the manufacturer (MP Biomedicals Asia Pacific Pte Ltd, Singapore). The immunoserology screening of anti- HBc, an antibody to HBV core antigen (HBcAg) in plasma samples, was performed using an enzyme immunoassay 4th generation diagnostic MP 4.0 Anti -HBc ELISA (MP Biomedicals Asia Pacific Pte, Ltd, Singapore).

Finally, the immunoserologic diagnosis of anti-HBs, antibody to the surface antigen of HBV (HBsAg), in plasma samples was conducted using a 4th generation immunoenzimatic test, MP Diagnostic Anti-HBs ELISA 4.0, according to the manufacturer's procedures test (MP Biomedicals Asia Pacific Pte, Ltd, Singapore).

Screening for HCV

The immunoserologic diagnosis for the presence of HCV was done by a screening of anti-HCV in plasma samples using an enzyme immunoassay 3rd generation HCV ELISA 3.0 MP Diagnostic and following the manufacturer's instructions (MP Biomedicals Asia Pacific Pte, Ltd, Singapore). The presence of anti -HCV antibodies in plasma samples was indicative of infection by hepatitis C.

Screening for HIV

The biomarkers screening for the presence of HIV was made using two immunoassays 4th generation with the capacity to detect antibodies and antigens of HIV. The initial HIV screening was performed using the immunoassay test Vironostika HIV Ag/Ab (Biomerieux SA, Marcy l' Etoile, France). All samples with reactive results to antibodies and to HIV antigens were retested using a second immunoenzimatic assay, MP Diagnostics HIV Ag/Ab Combo ELISA 4.0, according to the manufacturer's procedures (MP Biomedicals Asia Pacific Pte Ltd, Singapore). The HIV positive result indicating the presence of HIV was considered when the sample had a reactive result in the first and second tests respectively. Those showing a non-reactive result of the first test were classified as seronegative for HIV. Those having a non-reactive result in the second test, the third test was performed using the second immunoenzimatic assay. If the result were reactive, the samples were classified as being seropositive for HIV, and if the result was non-reactive, the samples were classified as seronegative. There were a few samples that were classified as having indeterminate results due to insufficient plasma to complete the testing procedures. See below diagram of the algorithm for the laboratory diagnosis of HIV.

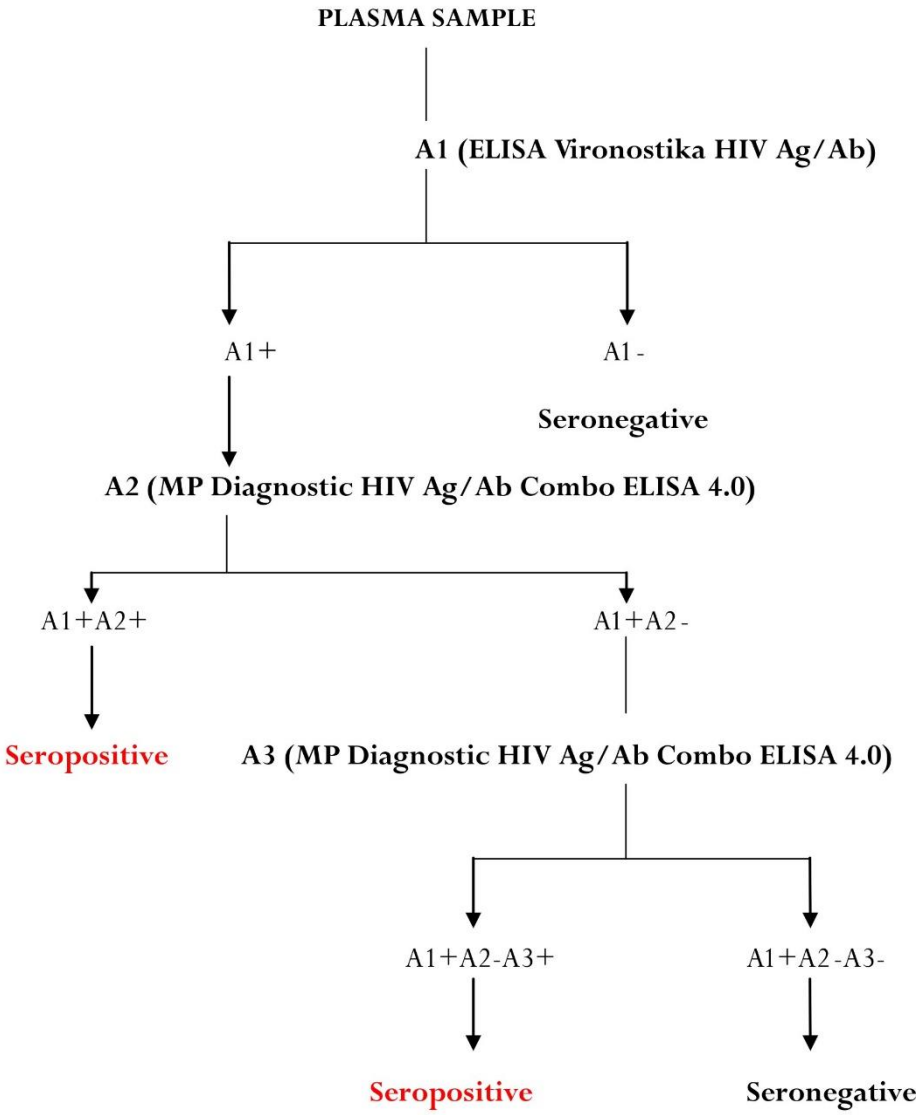

Figure 1: Laboratory algorithm for HIV diagnosis.

Screening for Syphilis

The syphilis serologic test is used to detect antibodies against Treponema Pallidum the causative agent of syphilis. Two groups of antibodies are searched for. The first group is antibodies against non-treponema antigens, such as the lipid structures (phospholipids), resulting from infection by the organism T. pallidum. Screening can be performed by a test using RPR (Rapid Plasma Reagin). This test is relatively nonspecific, especially in titles lower than 1/16. The result can characterize a false-positive reaction, occurring in individuals with autoimmune diseases, malaria, viral and bacterial infections, and even pregnant women. Titres

higher than 1/16 are suggestive of Treponema pallidum infection. The RPR is useful in the therapeutic segment, becoming positive 2 to 3 weeks after the patient has been infected.

The second type of antibody is directed against components of the *Treponema* and can be performed using the FTA-ABS test (fluorescent treponemal antibody absorption), the TPHA test (Treponema pallidum Haemagglutination) and TPPA test (T. pallidum agglutination) the last test is used in the reference laboratory for microbiology. The previous tests are considered confirmatory for syphilis diagnosis when the RPR test is positive.

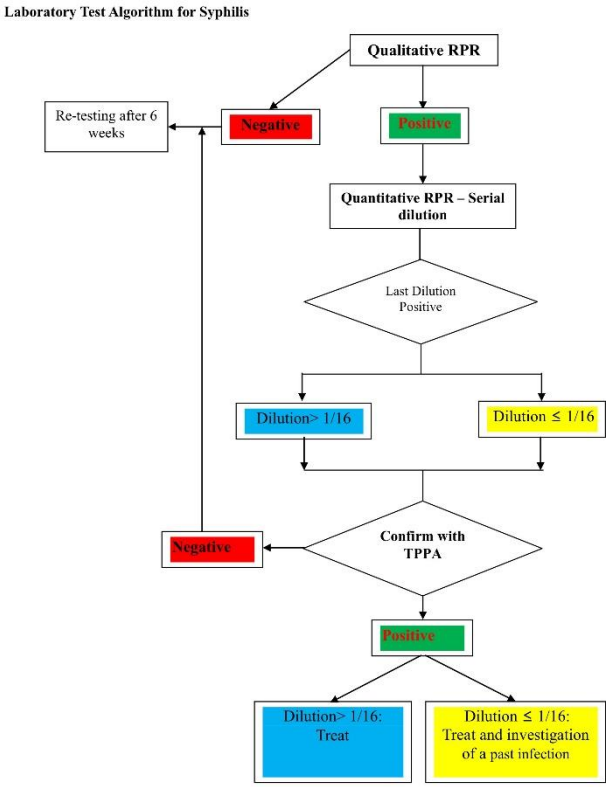

Figure 2: Laboratory algorithm for Syphilis diagnosis.

Patients with *Syphilis*, after treatment, may have persistent positive reactions in the RPR (lower titers, equal to or less than 1/8), without clinical significance, which are recognized as serological scars.

RPR (Rapid Plasma Reagin)

Rapid test for the qualitative and quantitative detection of syphilis serum or plasma. The RPR is a nontreponemal technique for the rapid diagnosis of syphilis. The RPR antigen is a modification of the VDRL antigen containing additives to eliminate the need for inactivation of the serum to increase the suspension stability and to facilitate visual reading of the reaction.

The antigen of RPR is a cardiolipínica suspension containing microparticles of coal. This antibody detects an antigen, termed reagin, which is present in the serum of patients with syphilis. If there are antibodies in the sample (reagins), they react with the antigen to form a complex with the coal microparticles coagulate, forming black lumps whose size depends on the sample. If the reaction is negative, the reaction remains mixture unchanged, showing, in this case, a homogeneous grey color.

Test procedures and interpretation of the results

Qualitative test: The screening tests were performed according to the description on the manuals of qualitative methods procedures. The interpretation of the results was made from the presence of aggregates of carbon black around the edge was reported as RPR Positive. The presence of small aggregates of carbon black around the edge was reported as weak positive RPR. The absence of aggregates was reported as negative RPR.

Quantitative Test: The tests were performed according to the procedures described in the manual of screening for the quantitative methods. The interpretation of the results was reported from the coefficient of dilution that still represents clearly the Reactive Result: Positive RPR + coefficient of dilution. Titles greater than 1/16 were suggestive of Treponema infection.

The confirmation of the results was made using the TPPA test.

4.4 Ethical clearances

The study was approved by the Ministry of Health and by the National Bioethics Committee of Mozambique. All measures were taken to ensure confidentiality and not to change the normal service procedures. The interviews were administered in a consultation office, where pregnant women followed all the clinically recommended procedures. All participants gave their written informed consent prior to inclusion.

5. RESULTS

5.1 HIV and Viral Hepatitis B, C in Mozambique (paper I).

Abstract:

Introduction: Mozambique is one of the most affected countries by the AIDS epidemic in the world, with an HIV prevalence of 11.5% in the 15-49-year age group. Due to the shared mode of transmission, coinfection with Hepatitis B (HBV) and C (HCV) are common, in Africa particularly in Mozambique. The study aims to assess the prevalence of HIV, HBV and HCV coinfection in Mozambique.

Methods: From January 1996 to April 2016, we searched the literature for articles that assessed the prevalence of HIV, HBV or HCV infection and coinfection, in Mozambique. We searched multiple English and Portuguese electronic data sources including PubMed and Google Scholar. Keywords that we used for our search were “HIV and HBV”, “HIV and HCV”, “HIV and viral hepatitis” and “coinfection and HIV”. Studies that reported HIV, HBV or HCV infection were also included.

Results: Few HIV, HBV, and HCV prevalence studies conducted in Mozambique, were performed on HIV-positive blood recipients from refugees in Mozambique from neighboring countries such as South Africa and Swaziland; only one study was done on the health of young people, in Maputo.

Conclusion: The prevalence of HIV and HBV is higher and, HCV remains with low prevalence in Mozambique. HBV may also have been transmitted vertical in children, and screening for HBsAg could contribute substantially to avert the negative impact on morbidity and mortality of HIV/HBV coinfected individuals.

Keywords: Human immunodeficiency virus (HIV), hepatitis B virus (HBV), hepatitis C virus (HCV), and viral hepatitis coinfections in Mozambique.

Introduction

The Human Immunodeficiency Virus (HIV) and the Acquired Immunodeficiency Syndrome (AIDS) pandemic continuous to be a cause for worldwide concern**.** Presently estimates show that 36.9 million people were living with HIV and AIDS, some 2 million were newly infected people and the number of deaths related of AIDS illness was 1.2 million worldwide (1). The HIV/AIDS epidemic poses a challenge to the Sub-Saharan Africa, particular in Mozambique (80), the countries most affected by the pandemic, with an HIV prevalence of 11.5% in the 15-49 year age group (5, 6).

Globally, estimates show that of all people living with HIV worldwide, about 2 - 4 million also have Hepatitis B Virus (HBV) infection and 4 – 5 million people Hepatitis C virus (HCV) infection (2). HIV is associated with a higher prevalence of both HBV and HCV in Sub-Saharan Africa. A systematic review and meta-analysis of people infected with HIV showed Hepatitis B surface Antigen (HBsAg) and antibodies to Hepatitis C Virus (anti-HCV) prevalence of 15% and 7%, respectively. The risk ratios (RRs) for being HBsAg positive and anti-HCV positive were 1,40 and 1.60 in HIV-infected, as compared to HIV-uninfected patients (7).

An estimated 350 million people are chronically infected with HBV and are at risk of developing hepatocellular carcinoma (HCC), with over 2 billion individuals being exposed to the virus (13). Chronic infection with HBV is the most frequent cause of this type of a tumour, representing more than 50% of global cases. In HCC endemic regions, this number rises to almost 70 - 80% of the cases, becoming the sixth most common type of cancer today. The incidence of HCC among individuals with chronic HBV infection ranges from 400 to 800 in males and from 120 to 180 in females, per 100.000 persons/year. Approximately 80% of HCCs cases occur in developing countries in regions such as the Asia-Pacific and Sub-Saharan Africa where HBV infection is endemic and has a high incidence (14, 15).

The Sub-Saharan Africa Coinfections Panorama

In Africa, about 50 million people are a chronic carrier of HBV, with 25% of mortality risk. The Sub-Saharan Africa countries are in a high endemicity region with HBsAg carrier rates between 9 – 20% (16).

HBV infection is acquired during the prenatal period, at birth or during the first months or years of life. Frequently infection becomes chronic. The risk of developing HCC is higher in the presence of cirrhosis, obesity and diabetes mellitus, and co-infection with hepatitis C virus. It has been identified factors associated with a high risk of HCC include demographic (male sex and age), lifestyle (alcoholism and smoking), viral (genotype C, D, and F, an elevated level of HBV-DNA, nucleus/mutation pre-core) and clinical liver cirrhosis and other factors. Although the incidence of chronic hepatitis B has been falling as a result of universal infant immunization (14, 15, 17-21).

Approximately 6-10% of individuals infected with HIV are more likely to be infected with HBV, an estimated 2.5 - 3 million people. Studies show that HIV infection impacts negatively on the evolution of hepatitis, resulting in a higher rate of chronicity of HBV after acute infection, by increasing the replication rate of DNA-HBV and exacerbates fibrosis, a lower rate of Hepatitis B e Antigen (HBeAg) seroconversion and a higher percentage of occult infections, which presents serious problems for diagnosis, prevention and control. The presence of co-infection also worsens the outcome of HBV infection treatment (22, 23).

About 25% (10 million) of HIV infected patients are estimated to also be infected with the Hepatitis C Virus (HCV). There is no consensus about the negative effect of HIV infection on the evolution of hepatitis caused by HCV. Nevertheless, it possibly increases RNA HCV by accelerating the progression of fibrosis and increasing the rate of chronicity of HCV, thereby facilitating the sexual and vertical transmission of the virus (22).

In many countries worldwide chronic liver disease caused by infection with HBV and/or HCV in HIV-infected patients is common, making it one of the causes of morbidity and mortality among HIV-infected people. The coinfection in HIV patients with HCV is particularly high in areas where intravenous drug use is high (25, 26).

The prevalence of HCV infection in pregnant women is estimated to be between 1 -8%, in children between 0.05% - 5%, worldwide. In developed countries, perinatal transmission is now the leading cause of HCV transmission and HIV coinfection is associated with increased

transmission (27). Mother-to-child transmission (MTCT) of HCV is not a major route of HCV transmission (42, 43).

HIV plays an important role on HBV transmission: a study conducted in Mozambique and Zambia among HIV positive individuals, showed high median HBV viral loads, and CD4 cells count below 200/µl, HBeAg-positivity was associated with high HBV DNA (>20,000 IU/ml), and genotypes A1 (58.8%) and E (38.2%) were most prevalent (36).

Routine antenatal HBV screening should be offered in HIV/HBV endemic regions, especially for HIV-positive pregnant women, to allow the identification of neonates who are in need of HBV passive immunoprophylaxis at birth. This strategy, together with antenatal antiretrovirals, will contribute to reducing the risk of perinatal HBV transmission (62). To reduce the risk of infection of the mothers, the appropriate emphasis should be given to increasing awareness and intensive public health education about the horizontal transmission HBV (63, 64). In Mozambique a report from the National Health System (NHS), showed that the percentage of women with at least one prenatal consultation had been increasing in recent years, reaching 91% of pregnant women, in 2012 (65).

The efficiency of HIV transmission male-to-female is 2.3 times greater than female-to-male transmission, during the sexual intercourse, are possible reasons for the difference in efficiency of transmission (69, 70).

Global Knowledge regarding the prevention of HIV transmission has increased, condom use has risen amongst people with multiple sexual partners and the proportion of young people who have received an HIV test and learned their results has also increased. Countries now also have the potential to reach at least 90% of pregnant women living with HIV with antiretroviral interventions by 2015 (66).

Objective: To assess the prevalence of HIV, HBV and HCV coinfection in Mozambique.

Methods

Information sources and search

We searched the literature, from inception, for articles that assessed the prevalence of HIV, HBV or HCV infection and coinfection. Between September and October 2017, we searched PubMed.

We reviewed the titles and abstracts to select potentially and relevant papers. The full text was reviewed only if there was a doubt about the suitability of the paper based on the abstract. For inclusion, we searched electronic abstracts from articles conducted in Mozambique.

The expression used for our search was ((HIV AND HBV) OR (HIV AND HCV) OR (HIV AND viral hepatitis) OR (coinfection AND HIV)) AND Mozambique.

Eligibility criteria and study selection

We only included studies that recruited participants living in Mozambique, published in English or Portuguese, measured HIV (HIV Ab), HBV (HBs Ag) or HCV (HCV Ab) infection and coinfection. We excluded studies with 1) no accessible full text and no sufficient data in abstract, 2) unclear serological tests to detect the three infections.

Data collection and Analytic Approach

Data were extracted and checked for the following items: type of study, sample size, location and time of the study, type of participants and prevalence of HIV, HBV, HCV, and coinfections. We grouped the participants into four subpopulations 1) Replacements blood donors, 2) patients with HIV infection, 3) Refugees and 4) general population. The outcome of the studies was reported as prevalence, with point and 95% confidence intervals.

Results

We found 43 abstracts in our literature review. After screening of title and abstract 25 remained for full-text review. Of those, 17 articles were excluded for various reasons including: no report of coinfection; full text was not available; other scientific field of study, such as

molecular, cost economic; and specific subpopulations not listed in the four population categories we have chosen.

According to the table 1, which describe the results of the studies conducted in Mozambique, among 1578 replacement blood donors, HBsAg seroprevalences in men and women are 10.6% and 4.5%, respectively, and an Anti-HCV seroprevalence of 1.2% and 1.0 %, respectively (35). In a recent study among voluntary and replacement blood donors, in the Provincial Hospital of Tete, no HCV infection was found. The prevalence for infection by HIV, HBsAg, and syphilis were 8.5%, 10.6%, and 1,2% respectively (38). Another study conducted between HCC and HCV, sera from 178 patients with HCC and 194 from Maputo blood donors, were tested from Anti-HCV, showing the higher prevalence of Anti-HCV in patients with HCC than in the controls but there was a negative association between Anti-HCV and HBsAg in patients with HCC, that was not significant after adjustments for age (81). A study conducted among 2019 blood donors, fund a prevalence of HIV and HBsAg 5.7% and 6.0%, respectively (82).

A study conducted in four rural clinics in northern Mozambique among HIV positive individuals, revealed a prevalence of 7.6% HBsAg-positive (36), another study conducted in two health centres in Maputo, on 518 HIV infected with and without HBV co-infection naïve adults, found a prevalence of 9.1% subjects coinfected with HIV and HBV (83). In a study conducted in Zambia and Mozambique, among 1032 HIV infected patients, showed 7.6% individuals HBsAg positive (36). A study conducted in 2 urban clinics in Zambia and 4 rural clinics in Mozambique, 1812 individuals, HIV-positive were enrolled (755 from Zambia and 1057 from Mozambique), no patient from Mozambique was confirmed Anti-HCV (84).

A study conducted on 428 Mozambican refugees in South Africa for markers of exposure of HBV and HCV, showed that 56% of the population had anti-HBsAg, while 13.2% were also HBeAg positive and 3.2% were anti-HCV positive (37). Another study conducted in the Malindza camp of refugees, in Swaziland, found the prevalence of 10.8% of HIV, 65.7% for any HBV mark and nil HCV (85).

A total of 1380 youths, aged 18 -24 years, were enrolled, at Youth Clinic in Maputo Central Hospital, to determine the prevalence and incidence of HIV, prevalence of HBV and prevalence of Syphilis, and the results of the study showed a prevalence of HIV and HBV of 5.1% and 12.2%, respectively (86).

Discussion

There are few studies conducted and published in Mozambique reporting the co-infection of HIV, HBV, and HCV. One published study was conducted among replacement blood donors, in Maputo Central Hospital, found a higher prevalence of HBV with an estimated prevalence of 9.3% for HBsAg and lower the prevalence of Anti-HCV (35). This data is consistent with other studies conducted in African countries such as Cameroon where it was reported a prevalence of 23.7% in people infected with HIV were HBsAg+, amongst those patients 12% also tested positive for HBeAg, which indicates that viral replication was active, and 7.2% were Anti-HCV+, and the coinfected prevalence for both HBV and HCV was 2% (87), indicating that the risk of HCV infection remains very low in Sub-Saharan countries.

In a study conducted in Abuja, Nigeria was shown a prevalence of 0.7% in HIV-infected people, with HBV and HCV (88). These findings can be explained by the wide variation in the way of transmission of these viruses, depending on regions such as Europe, Asia, Central and South America, where most transmissions occurs through injectable drug use (89), therefore, the studies conducted in Sub-Saharan countries found a similar prevalence of 1.2% of Anti-HCV positive (90) Due to the shared mode of transmission of both viruses (HBV and HIV) coinfection is also common in people infected with HIV in African countries (91).

The HCV coinfection in HIV-infected people is poorly documented in Mozambique, only one study assessed the prevalence of Anti-HCV, among youth at Central Hospital (86). Although it is known that with HIV+ people, the chance of HCV infection is higher, but evidence from African studies indicate a prevalence of 0.76% for HIV/HCV (91), from the systematic review study conducted in Africa, showed a greater predominance of HIV/HBV coinfection compared to HIV/HCV coinfection (92).

Finally, in Sub-Saharan Africa, where is the heart of HIV pandemic, there is a preponderance of HIV and HBV coinfection compared to HIV and HCV, leading to a significant limitation of HCV seroprevalence surveys published in the region (92).

Conclusion

The prevalence of HIV and HBV is higher and, HCV remained of low prevalence in Mozambique. HBV may also have been transmitted horizontally in children, and screening for HBsAg could contribute substantially to avert the negative impact on morbidity and mortality of HIV/HBV coinfected individuals. However, significant investment is required in large multi-center collaborative prospective clinical cohorts with HIV, HBV and HCV co-infection that incorporate sample collection for basic science research, not yet possible in Mozambique.

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Table 1: Summary of Studies That Highlight the coinfection conducted in Mozambique

Authors (ref. #)	Group	Sample Size	Study Site	HIV Prevalence	Prevalence of HBsAg-positive	Anti-HCV Prevalence	Co-Infection HIV and HBV Prevalence	Co-Infection HIV and HCV Prevalence	Most frequent HBV Genotype	CD4 T Cells count	HBsAg+ HBV DNA	HBV-DNA≥20.000	HBV-DNA20<20.000
Cunha L (31)	Replecement Blood donors	1578	Maputo Central Hospital	Men - 12,3% Women - 15,4%	Men - 10.6% Women - 4.5%	Men - 1.2% Women - 1.0%	2.0%	-	A - 83%	-	-	-	-
Stokx J (32)	Blood donors	750	Provincial Hospital of Tete	8.5%	10.6%	0.0%	1.0%	0.0%	-	-		-	-
Dazza MC (33)	Patients with HCC and Blood donors	178 patients with HCC and 194 blood donors	Maputo Central Hospital	-	66,3% patients with HCC and 13,9% Blood donors	4,3% patients with HCC and 3,8% Blood donors	-	-	-	-	-	-	-
Gudo ES (34)	Blood donors	2019	Maputo Central Hospital Blood Bank	5.7%	6.0%	-	-	-	-	-	-	-	-
Wandeler G (23)	HIV-infected patients	1032	Mozambique and Zambia	-	7.6%	-	8.0%	-	-	-	92.9 %	49.4%	16.7%
Chambal LM (35)	HIV infected patients	518	Health Centres, in	-	-	-	9.1%	-	-	361 T Cells/mm3	-	26.1%	52.20%

			Maputo City											
Wandeler G (36)	HIV infected patients	1057	Mozambique and Zambia	-	-	0%	-	-	-	255 Cells/mm3	-	77 (49.4%)	26 (16.7%)	
Viegas EO (39)	Youths	1380	Youth clinic in Maputo Central Hospital	5.1%	12.2%	-	4.9%	-	-	608 cells/mm3	-	-	-	

5.2 Prevalence of HIV, Hepatitis B, Hepatitis C and Syphilis among Pregnant Women in Mozambique – a cross-sectional study (paper II).

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Abstract

Of the 36.9 million people living with HIV worldwide, it is estimated that some 2 to 4 million also have Hepatitis B Virus (HBV) and 4 to 5 million have Hepatitis C virus (HCV) infections. Due to shared modes of transmission, HBV, HCV and Syphilis are also major public health concerns. The present work aimed at estimating the prevalence of these infections among pregnant women attending antenatal care in Nampula, north of Mozambique. This cross-sectional study was conducted in six urban health facilities offering antenatal care. One in every three pregnant women attending their first antenatal appointment were invited to participate. Overall 1216 pregnant women accepted to participate of whom approximately half provided plasma samples for HIV, Hepatitis B, Hepatitis C and Syphilis tests. Infections were assessed according to standard laboratory procedures and algorithms. Behavioral and socio-demographic data were collected using a structured questionnaire. The prevalence of HIV infection was 30.3%, 40 women (6.2%) had chronic Hepatitis B and 451 (69.9%) had had a previous Hepatitis B infection, 4 (0.9%) had Hepatitis C and 3 (0.5%) had Syphilis. Among the 201 HIV-positive women, 29 (14.4%) were aware of their infection and 17 (58.6%) were under treatment. Compared to women newly diagnosed with HIV, those aware of their infection were older, had a higher gestational age at first appointment, were less frequently primigesta although one-third of newly diagnosed women had 4 or more gestations. There were no significant differences between the two groups regarding condom use in the last sexual intercourse. The prevalence of HIV and hepatitis B among pregnant women in the north of Mozambique was very high, syphilis being unexpectedly low. Awareness of HIV status was very low and risk behaviors common, reinforcing the central role of prenatal care.

Key Words: *Prevalence HIV, HBV, HCV, Syphilis; Coinfections; Pregnant Women*

Background

In 2016, estimates showed that 36.7 million people were living with HIV and AIDS worldwide (1). In Sub-Saharan Africa, there are 24 million people living with HIV, adolescent girls and young women account for one in four new HIV infection (2). Worldwide, Mozambique is one of the most affected countries of HIV and AIDS, with a prevalence, in the general population, of 11.5% at the ages of 15-49 years old (3). A National Antenatal Care HIV Surveillance Survey, conducted by the National Institute of Health, in 2011, showed a national prevalence of 15.4%, and 10% in the northern region. In Nampula city, the prevalence was 19.9% (4).

Globally, of the 35 million people living with HIV, some 2 to 4 million also have Hepatitis B Virus (HBV) infection and 4 to 5 million people Hepatitis C virus (HCV) infection (2). HBV is a major public health concern with 350 million people chronically infected (5, 6), and in Africa, around 75% of hepatocellular carcinoma cases in men is associated with HBV infection (7). The World Health Organization (WHO) estimates that the prevalence of HCV worldwide is between 1% and 8% in pregnant women, between 0.05% and 5% in children and approximately 3% of the world population have been infected (8). The HCV prevalence is poorly documented in Mozambique. A study conducted in the city of Maputo showed a prevalence of 1% of anti-HCV among replacement blood donors (9)**;** another study conducted in Tete province, found a prevalence of 10.6%, where 90% of participants were men (10).

A study conducted among HIV infected pregnant women in Europe, showed a prevalence of 4.9% Hepatitis B surface Antigen (HBsAg) positive, 12.3% Anti-HCV positive, and women with a history of injecting drugs were those who had the highest Anti-HCV positive while, HBsAg positive was associated with African origin (11). HIV/HBV coinfection is associated with worse liver health than HBV mono-infection (7). Another study conducted in Kwazulu-Natal, involving 570 pregnant women**,** showed an antenatal HIV and HBsAg prevalence of 41.6% and 5.3%, respectively, a 3.1% prevalence of HIV/HBV coinfection, with hepatitis B e Antigen (HBeAg) positive and HBV DNA significantly higher in co-infected pregnant women (12).

Results from a retrospective study, in Abidjan, showed a similar proportion of HBsAg among pregnant women HIV positive and HIV negative, nevertheless chronic HBV, based on DNA positive results were more frequent in HIV positive pregnant women, while in HCV prevalence for both groups were 1%, and frequency of HIV/HBV coinfection was higher (13). Mother to child transmission (MTCT) of HBV is an important mode of transmission because the earlier an individual is infected, the more likely he/she will develop a chronic infection (14). Prevention of MTCT of HBV continues to be a challenge in most Sub-Saharan African (SSA) countries. Despite the HBV birth-dose vaccination implemented, the HBV vaccine coverage remains low in most SSA countries (15).

Routine antenatal HBV screening should be offered, in HIV/HBV endemic regions, especially for HIV-positive pregnant women, allowing identification of neonates who are in need of HBV-passive immunoprophylaxis at birth. This strategy together with antenatal antiretrovirals will contribute to reducing the risk of perinatal HBV transmission (12). To reduce the risk of infection of mothers, appropriate emphasis should be given to increasing awareness and intensive public health education explaining the horizontal transmission HBV (16, 17).

A study conducted in southern Tanzania showed that HCV in African countries MTCT does not play a significant role in HCV infant acquisition (18).

Syphilis is a major public health problem in Sub-Saharan Africa. A study conducted among pregnant women, in Gondar, Ethiopia, found a high prevalence of syphilis (3.7%) and coinfection rate of HIV/Syphilis was 1%, the high prevalence of syphilis being among housewives (15.2%) and also was associated with illiteracy of husband (19).

Several studies have shown the relation of adverse pregnancy outcomes with a high prevalence of syphilis such as the maternal history of syphilis, congenital syphilis, stillbirth, miscarriage among pregnant women (20-22). The prevalence of syphilis, HIV, and HBV has been shown to vary by time period, geographic area and study population (20, 23, 24).

Routine HIV testing, HBV and syphilis screening at antenatal care represent an opportunity to adopt preventive behaviors on prevention and transmission strategies of these diseases, and

this could emphasize individual and societal benefits when pregnant women are aware of her condition (22, 25, 26).

The objective of the present study was to assess the prevalence of HIV, HBV and HCV coinfections among HIV patients and pregnant women in Nampula, Mozambique.

Methods

Setting and study population

This was a cross-sectional study conducted from February 2013 to January 2014 in six urban health facilities offering antenatal care services in Nampula City, Mozambique. The health facilities were in five health centres ("Hospital Geral de Marrere", "Centro de Saúde 25 de Setembro", "Centro de Saúde 1º de Maio", "Centro de Saúde de Namicopo", "Centro de Saúde 1º de Maio" and "Centro de Saúde de Muhala Expansão"). One in every three pregnant women attending the six health centers for their first prenatal appointment were invited to participate in the study. In total, 1440 pregnant women were invited to participate and 1216 (84.4%) agreed to participate. Participation in the study involved a face-to-face interview conducted by trained maternal and child health nurses and the collection of blood for laboratory analysis of HIV infection, Hepatitis B and Hepatitis C and syphilis.

Ethics

The study was approved by the Ministry of Health and by the National Bioethics Committee of Mozambique. All measures were taken to ensure confidentiality and not to change the normal service procedures. The interviews were conducted in a consultation office, where pregnant women followed all the clinically recommended procedures. All participants gave their written informed consent prior to inclusion.

Questionnaire and measurement tools

Maternal and child health nurses were trained to conduct the face-to-face interviews using a structured questionnaire. The structured questionnaires included sociodemographic information (age, sex, marital status, occupation, education); use of alcohol, tobacco, drugs

and non-prescribed pills; information on maternal health (weight, gestational age, parity and history of abortion); information on sexual health (age at 1st sexual intercourse, type of partner and condom use in the last sexual intercourse, other sexual partners); history of non-sexual exposures to HIV, HBV, HCV; knowledge regarding HIV/AIDS, HBV, HCV modes of transmission and knowledge regarding other sexually transmitted infections (STI´s); history of HIV, hepatitis B, hepatitis C, STI and tuberculosis diagnosis.

Data were entered into a database and double checked for accuracy.

Blood samples were collected as part of the routine procedures of the first antenatal care appointment established by the National Health Services (NHS) that include the test for HIV infection and syphilis. The analysis for Hepatitis B and Hepatitis C were added as part of this study. The tests were performed at the laboratory of National Institute of Health, at the Ministry of Health.

During transportation from Nampula to Maputo, a considerable amount of plasma samples out of the 1216 collected from pregnant women were lost by the national air carrier. In the end, 663 (54.5%), 645 (53.0%), 435 (35.8%) and 666 (54.8%) plasma samples were available for laboratory analysis of HIV, Hepatitis B, Hepatitis C and Syphilis, respectively.

Laboratory procedures

Plasma samples of pregnant women were collected and kept frozen at −80°C until analysis. Participants were informed, in following appointments, about the analytical results. For those who were positive**,** either for HIV positive or Syphilis positive results, were treated following the available and recommended specifics medicines.

Screening for HIV

Screening for HIV was performed using Vironostika HIV Ag/Ab (Biomerieux SA, Marcy l' Etoile, France), a 4th generation enzyme immunoassay to detect HIV-1/2 antibodies and HIV-1 p24 antigen (manufacturer-described Sensitivity of 100% and Specificity of 99.5%). The non-reactive results were considered as negative for HIV and the reactive results were further confirmed using MP Diagnostics HIV Ag/Ab Combo ELISA 4.0 (MP Biomedicals Asia Pacific

Pte Ltd, Singapore), an enzyme-linked immunosorbent assay (ELISA) to detect HIV-1 (group M - O) or 2 antibodies and/or antigens (manufacturer-described Sensitivity of 100% and Specificity of 99.76%). A reactive result on this second test confirmed the HIV infection and was considered positive. Those having a non-reactive result in the second test were retested using the same assay. If the result was reactive, the samples were classified as being positive for HIV, and if the result was non-reactive, the samples were classified as negative for HIV. There were a few samples that were classified as having indeterminate results either due to discordant results in the two assays or insufficient plasma to complete the testing procedures.

Screening of biomarkers for HBV

All plasma samples were tested for Hepatitis B Virus Surface Antigen (HBsAg) using an ELISA test MP Diagnostics HBsAg ELISA 4.0 (MP Biomedicals Asia Pacific Pte Ltd, Singapore; manufacturer-described Sensitivity of 100% and Specificity of 99.58%), for antibodies to Hepatitis B Virus Surface Antigen (anti-HBs) using the MP Diagnostic Anti-HBs ELISA 4.0 (MP Biomedicals Asia Pacific Pte, Ltd, Singapore; manufacturer-described Sensitivity of 100% and Specificity of 99.58%), for Hepatitis B Virus e Antigen (HBeAg) using the 4.0 MP Diagnostic HBeAg ELISA (MP Biomedicals Asia Pacific Pte Ltd, Singapore; manufacturer-described Sensitivity of 100% and Specificity of 99.93%) and, finally, for antibodies to Hepatitis B Virus Core Antigen (anti-HBc) using the MP Diagnostics Anti-HBc ELISA 4.0 (MP Biomedicals Asia Pacific PTE Ltd, Singapore; manufacturer-described Sensitivity of 99.82% and Specificity of 99.92%) and finally. The Hepatitis B status was then coded into the following categories according to the results of the previous tests: no previous contact (anti-HBc negative); previous infection resolved (anti-HBc positive and HBsAg negative); and chronic infection (anti-HBc positive and HBsAg positive)

Screening for HCV

Screening for HCV was performed by the detection of antibodies to the HCV (anti-HCV) using the HCV ELISA 3.0 MP Diagnostic (MP Biomedicals Asia Pacific Pte, Ltd, Singapore;

manufacturer-described Sensitivity of 99.79% and Specificity of 99.55%). The presence of anti-HCV antibodies in plasma samples was indicative of infection by hepatitis C.

Screening for Syphilis

The assessment of syphilis infection was performed using first a non-treponemal test - the Rapid Plasma Reagin (RPR) intended to detect antibodies to non-treponema antigen directed against a lipoid structure (phospholipids), resulting from *T. pallidum* infection. If the qualitative result of the test was non-reactive the sample was considered negative for syphilis. All samples with a reactive qualitative RPR result were diluted in 1:2, 1:4, 1:8, 1:16 and 1:32 dilutions and a confirmatory treponemal test were performed – the *T. pallidum* particle agglutination test (TPPA).

Statistical Analysis

The characteristics of participants were described using absolute and relative frequencies in the case of categorical variables. Means and standard deviation (SD) were used to describe continuous variables. Comparisons between groups were performed using the $\chi 2$ test or Fisher's exact test when variables were categorical. For continuous variables, the T-student test for independent samples was used. A significance level was fixed at 0.05. The analyses were performed using the SPSS software for Windows, version 22.0 (SPSS Inc., Chicago, Illinois, USA).

Results

The age of the participants was 22 (18-28) years. The majority of participants 498 (41.5%) were cohabiting with a partner. Most women 449 (39.6%) either did not finish primary school or had no education, and the majority 929 (77.3%) were housewives. Most women 669 (56.2%) had their first sexual intercourse at age range 15-17 years.

It was found a prevalence of HIV infection of 30.3% (202 women), of these HIV-positive women 29 (14.4%) were aware of the infection and 17 (8.4%) were under treatment. Forty women (6.2%) had chronic Hepatitis B and 451 (69.9%) had had a previous Hepatitis B infection, of these only 3 reported a previous diagnosis of Hepatitis B. The prevalence of

Hepatitis C was of 4 (0.9%) women, of these none, reported to be aware of the infection. Three women (0.5%) had an active syphilis of whom 2 reported a previous diagnosis of syphilis.

In this study, it was found a prevalence of coinfection HIV/HBV, HIV/HCV, and HIV/Syphilis, of 3.6%, 0.2% and 0.5%, respectively.

The prevalence of HBV (HBs Antigen) in HIV infected pregnant women was higher 30 (9.8%) compared to HBV 45 (6.8%) pregnant women HIV negative, however, the difference was not statistically significant (p=0.1).

Compared to women newly diagnosed with HIV, those aware of their infection were older (mean age 26.5 vs 23.0 old) and were less frequently married or cohabiting with a partner (17.2% and 24.1% vs 21.3% and 39.6%, respectively). No other differences were found in sociodemographic characteristics such as education and job situation. Concerning the maternal health women that were aware of their infection had a higher gestational age at first appointment (61.5% at 28 weeks or more vs 36.4%), were less frequently primigesta (7.4% vs 27.1%) although one-third of newly diagnosed women had already 4 or more gestations. There were no differences between the two groups regarding age at sexual debut, condom use in the last sexual intercourse and having had other partners beyond last sexual partner in the previous 6 months and women that were aware of their HIV infection reported more frequently that their last sexual partner was a friend or occasional partner that women that were newly diagnosed (20.7% vs 3.7%).

Discussion

The purpose of this study was to determine the prevalence of coinfection among pregnant women attending antenatal care**,** in Nampula city. The prevalence of 30.3% found in the present study is higher than that found by the National Antenatal care HIV Surveillance survey of 2011 for the health center located in the city of Nampula (19.9%) (4). The difference may be due to a larger sample (867) representative of the different degrees of risk since it was collected in all health centers of Nampula City while in the National Antenatal care HIV

Surveillance Survey the sample was smaller (357) from only one health center covering a smaller geographic area.

Little is known about the status of HIV co-infection with HBV, HCV, and syphilis in this population community so that these coinfected people may benefit from ART, including the treatment of associated coinfections (27). Pregnant women are an important group to be addressed, for designing interventions intending to reduce the burden of these diseases in the communities (28, 29).

The present study demonstrated that there were non-significant differences in HBV prevalence between HIV-infected and uninfected pregnant women. This finding is similar to other reported Southern Africa (SA) studies that may be explained by the cryptic transmission of childhood HBV instead of the shared routes of transmission of HIV and HBV in adulthood (30).

With regard to coinfection with HIV/HBV in pregnant women, it does not increase the risk of HIV transmission (31), however it is crucial to study the coinfection among pregnant women, because these women form a significant reservoir for horizontal or perinatal transmission of HBV and the establishment of routine screening to such women could allow an identification of a new baby born that require an active or passive immunoprophylaxis at birth. This may reduce the risk of HBV perinatal transmission in coinfected women that are considered to be of high risk (12). A history of induced abortion, baseline ALT elevated are significantly associated with HBV infection (28)**.**

In Africa, 40% to 60% of people who are chronic carriers of HBV, have acquired an infection during pregnancy (32). The World Health Organization recommends that, in countries with high HIV and HBV prevalence, pregnant women must be screened for HBV in order to start treatment recommended in the first quarter of pregnancy (33). The present study found HIV/HBV coinfection in 3.6% of pregnant women. These results are consistent with studies in other African countries, such as Republic of South Africa: HIV/HBV coinfection prevalence of 3.1% in Kwazulu Natal (12), and Angola: of 2.3% in Luanda (34).

In this study, it was found a prevalence of 0.9% Anti-HCV and the coinfection with HIV/HCV was 1 (0.2%). It is known that in HIV-positive people, the chance of HCV infection is higher, nevertheless, the evidence from African studies indicated a prevalence of 0.76% for HIV/HCV (35).

The prevalence of syphilis in this study was relatively low at 0.5%. This finding is consistent with studies conducted in other African countries, where the prevalence of syphilis in pregnant women was lower than that for most other prevalent sexually transmitted diseases, such as HIV and HBV (24, 36, 37). In one of these studies, syphilis was associated with reporting more than one lifetime sexual partner (36).

In this study, it was found that the prevalence of HIV/HBsAg+, HIV/anti-HCV, and HIV/syphilis, were 3.6%, 0.2% and 0.5%, respectively. These data are consistent with other African studies that have revealed a common frequency and prevalence of these infections (37-39). Coinfection with HIV/HBV was the most frequent and it was present in 3.6% of pregnant women, followed by HIV/syphilis and HIV/HCV which was found lowest in pregnant women. In African countries coinfection with HBV, HCV and Syphilis with HIV are most common among pregnant women (28, 29, 37). A systematic review study conducted in Sub-Saharan Africa showed a greater predominance of HIV/HBV coinfection compared to HIV/HCV coinfection (40).

The present study did not find the simultaneous coinfection by the three viruses. In a study conducted in Abuja, Nigeria, it was observed a prevalence of 0.7% in HIV-infected people, with HBV and HCV (41). These findings can be explained by the wide variation in the way of transmission of these viruses, depending on regions such as Europe, Asia, Central and South America, where most transmissions occurs through injectable drug use (42). Therefore, this prevalence should be compared with studies conducted in other countries in Sub-Saharan Africa where it was found a similar prevalence of 1.2% of Anti-HCV positive (43).

This study found an HIV/HCV coinfection prevalence of 0.2%. Similar studies in Tanzania and Angola have shown that MTCT does not play a significant role in HCV transmission (18, 34). The coinfection HIV/HCV, although not being a public health problem in

Mozambique, it is known that factors such as the Maternal HIV coinfection, HCV maternal viral load, intrapartum invasive procedures play a great roll on HCV maternal transmission (44, 45). In other studies conducted in African countries, the prevalence of HIV/HCV coinfections was 2.38% (46), which is in agreement with those observed in the present study.

Comprehensive screening for all pregnant women, as part of prevention strategies, needs to be reinforced (24, 37). A Nigerian study of sexual behavior in pregnant women revealed a decrease of sexual desire and frequency during pregnancy, and the majority of women (60%) started to use condoms after an HIV diagnosis in pregnancy to decrease the transmission of the virus (47). Prevention programs could increase the awareness of the risk of infection with HIV and other sexually transmitted diseases, by increasing condom use, women may also prevent future pregnancy (48).

Conclusion

The prevalence of HIV and hepatitis B among pregnant women in the north of Mozambique was found to be very high, syphilis being unexpectedly low. Awareness of HIV status was very low and risk behaviors common, reinforcing the central role of prenatal care.

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Table 1. Comparison of pregnant women HIV-positive according to being aware of their HIV status.

	Pregnant women HIV-positive		
	Unaware	Aware	p-value
	173 (85.6%)	29 (14.4%)	
SOCIODEMOGRAPHIC CHARACTERISTICS			
Health center			0.240*
Centro de Saúde Muhala Expansão	59 (35.8)	16 (55.2)	
Hospital Geral de Marere	5 (3.0)	0 (0.0)	
Centro de Saúde 25 de Setembro	56 (33.9)	7 (24.1)	
Centro de Saúde 1º Maio	34 (20.6)	3 (10.3)	
Other	11 (6.7)	3 (10.3)	
Total	165	29	
Age strata, years			0.012
<18	32 (20.3)	1 (3.6)	
18-19	34 (21.5)	1 (3.6)	
20-24	32 (20.3)	8 (28.6)	
25-29	31 (19.6)	10 (35.7)	
≥30	29 (18.4)	8 (28.6)	
Total	158	28	
Marital Status			0.030
Single/Widow/ Divorced /separated	12 (7.3)	7 (24.1)	
Married	34 (20.7)	5 (17.2)	
Cohabiting with partner	65 (39.6)	7 (24.1)	
Married traditionally	53 (32.3)	10 (34.5)	
Total	164	29	
Education			0.105
Without education	29 (17.7)	11 (37.9)	
Did not finish primary school	32 (19.5)	5 (17.2)	
Primary school (1st degree)	21 (12.8)	1 (3.4)	
Primary school (2nd degree)	34 (20.7)	5 (17.2)	
Secondary School	39 (23.8)	4 (13.8)	
Pre-University/University	9 (5.5)	3 (10.3)	
Total	164	29	
Job situation			0.121*
Employed	3 (1.8)	2 (6.9)	
Student	24 (14.6)	2 (6.9)	
Housewife/Unemployed	126 (76.8)	25 (86.2)	
Agriculture/Farmer	11 (6.7)	0 (0.0)	
Total	164	29	
MATERNAL HEALTH			
Gestational age at first appointment, classes			0.045
14 weeks or less	12 (7.3)	2 (7.7)	
15-27 weeks	93 (56.4)	8 (30.8)	
28 weeks or more	60 (36.4)	16 (61.5)	
Total	165	26	
Number of gestation			0.047
1	45 (27.1)	2 (7.4)	
2	40 (24.1)	5 (18.5)	
3	24 (14.5)	4 (14.8)	
≥4	57 (34.3)	16 (59.3)	
Total	166	27	
History of abortion			0.129

No	135 (81.3)	19 (67.9)	
Yes	31 (18.7)	9 (32.1)	
Total	166	28	
SEXUAL HEALTH			
Age at sexual debut, years			0.642*
<15	22 (13.3)	2 (6.9)	
15-17	94 (57.0)	16 (55.2)	
18-19	4 (2.4)	0 (0.0)	
≥20	2 (1.2)	0 (0.0)	
Does not remember	43 (26.1)	11 (37.9)	
Total	165	29	
Condom use in the previous sexual intercourse			>0.999*
No/Never heard about condoms	156 (94.5)	28 (96.6)	
Yes	9 (5.5)	1 (3.4)	
Total	165	29	
Last sexual partner			0.004*
Husband	149 (92.0)	21 (72.4)	
Boyfriend	6 (3.7)	1 (3.4)	
Friend/Occasional partner	6 (3.7)	6 (20.7)	
Rather not answer	1 (0.6)	1 (3.4)	
Total	162	29	
Other partners beyond last sexual partner in the previous 6 months			0.302*
No	134 (82.7)	21 (75.0)	
Yes	26 (16.0)	6 (21.4)	
Rather not answer	2 (1.2)	1 (3.6)	

* Fisher exact test

5.3 Knowledge about HIV, HBV and HCV modes of transmission among pregnant women in Nampula – Mozambique (paper III)

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Knowledge about HIV, HBV and HCV modes of transmission among pregnant women in Nampula – Mozambique

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ABSTRACT

The assessment of pregnant women's knowledge about modes of infections transmission is essential to tailor programs to their needs. This study aimed to assess knowledge about human immunodeficiency virus (HIV), hepatitis B virus (HBV), and hepatitis C virus (HCV) among pregnant women in Nampula – Mozambique, a high-risk area for sexually transmitted infections. At their first antenatal visit, women were invited to participate and data were collected by trained nurses at six public health facilities. Knowledge about HIV transmission modes was high but relevant misconceptions remained. However, knowledge regarding HBV and HCV transmission modes was very limited. There was a significant association between knowledge level and socioeconomic position, making education and women's empowerment key factors in a comprehensive strategy to prevent infections.

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Introduction

Mozambique is one of the most affected countries by the human immunodeficiency virus (HIV) epidemic with an estimated prevalence, in 2009, of 11.5% among 15–49 age group. Women in the age group of 15–24 had an estimated prevalence of 11.1%, much higher than the 3.7% prevalence among men in the same ages (Instituto Nacional de Saúde (INS), Instituto Nacional de Estatística (INE), & ICF Macro. 2010, 2010). Increased knowledge regarding HIV prevention among mothers was associated with less HIV infection in their children (Brewer, 2012) and is one of the core indicators to measure progress in the response to the epidemic (UNAIDS, 2014).

Similarly to HIV, Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are endemic in Mozambique and share transmission modes. A previous study showed a prevalence of 10.6% and 4.5% for HBV surface antigen (HBsAg) and of 1.2% and 1.0% for anti-HCV respectively among men and women blood donors in Maputo (Cunha et al., 2007).

Therefore, as for HIV, increased knowledge about transmission of viral hepatitis is important to prevent these infections (Chan, Lao, Suen, Lau, & Leung, 2011; Dinh et al., 2015; Tegegne, Desta, Tegbaru, & Tilahun, 2014). Pregnancy may be a privileged opportunity to educate women as those with at least one prenatal visit have been increasing, reaching 91% in 2012 (Ministério da Saúde, 2012) and they may be more predisposed to accept education about prevention (Ashimi, Omole-Ohonsi, Amole, & Ugwa, 2014; Barth, Huijgen, Taljaard, & Hoepelman, 2010). This study aimed to assess knowledge regarding HIV, HBV, and HCV among pregnant women in Nampula, Mozambique. Monitoring pregnant women's knowledge in a setting highly affected by these infections will provide information to tailor education programs.

Methods

A cross-sectional study was conducted in six urban health units in Nampula, Mozambique, offering antenatal care services. Nampula is located in northern Mozambique and the second most populated city in the country. Data was collected from February 2013 to January 2014 during face-to-face interviews conducted by trained maternal and child health nurses. An estimated average of 60 first prenatal appointments were expected per day. One in every three pregnant women attending their first prenatal appointment was invited to participate in the study. This strategy was considered to provide the best balance between causing the minimal disturbances to the daily work and time and resources available at the healthcare units. Overall, 1440 women were invited and 1216 (84.4%) agreed to participate. Of

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those, 1186 women provided a valid answer to the variables of interest.

A structured questionnaire was used to collect data on sociodemographic, behaviors, reproductive health, sexual history, previous diagnosis of infectious diseases, history of non-sexual exposures to HIV, HBV and HCV. The questions to test knowledge about transmission modes were based on a national survey on HIV prevalence in Mozambique (Instituto Nacional de Saúde (INS) et al., 2010) for a direct comparison.

Latent Class Models (LCM) were used to identify classes of knowledge about HIV, HBV and HCV transmission modes. LCM with three classes showed the smallest Bayesian information criterion and the smallest Akaike's Information Criterion (data not shown).

The model was interpreted by looking at the probabilities of correct answers on each item, conditional on class membership. For HIV, the first class presented the highest mean proportion of correct answers (83.9%) and the highest probability of correct answers for the false items; the second class presented the highest probabilities of the correct answer for the true items and a mean proportion of correct answers of 68.0%; the third class showed the lowest probability of a correct answer for almost all the items (mean of 23.7%). For HBV, the first class showed the highest mean proportion of correct answers (71.7%) and the highest probability of correct answers for almost all the items; the second class presented the highest probability of a correct answer for item 7 and a mean proportion of correct answers of 32.4%; the third class showed the lowest probability of a correct answer for almost all the items (mean of 0.2%). For HCV, the first class presented the highest mean proportion of correct answers (75.4%) and the highest probability of correct answers for almost all the items; the second class presented the highest probability of a correct answer for the items 5, 6 and 7 (all false) and a mean proportion of correct answers of 41.6%; the third class showed the lowest probability of a correct answer for almost all the items (mean of 0.1%). The proportions of correct answers for each type of infection are presented in Table 1.

Comparisons of proportions by latent classes were performed using the chi-square test (Pearson or Fisher's exact test) or McNemar as appropriate. A significance level was fixed at 0.05. Analysis were performed using the SPSS software for Windows, version 22.0 (SPSS Inc., Chicago, Illinois, USA). LCM were performed using the software R 2.8.1, specifically the poLCA package.

The study was approved by the Ministry of Health and by the National Bioethics Committee of Mozambique. Written informed consent was obtained from all participants.The interviews were conducted by nurses

Table 1. Proportion of correct answers for each statement and probability of correct answer in the 3- classes latent class model (LCM).

	HIV				Hepatitis B				Hepatitis C			
Statement (true/false)	Correct answers %	Class 1 %	Class2 %	Class3 %	Correct answers %	Class1 %	Class2 %	Class3 %	Correct answers %	Class1 %	Class2 %	Class3 %
1. Unprotected vaginal intercourse (t)	91.8	96.3	95.8	62.4	25.1	79.1	41.2	0.7	24.1	92.2	51.0	0.2
2. Unprotected anal intercourse (t)	79.9	80.7	91.6	50.6	23.4	74.8	37.1	0.3	21.3	86.4	41.8	0.0
3. Oral sex (t)	68.4	68.3	81.5	39.0	19.7	67.2	25.0	0.0	18.3	76.1	32.3	0.0
4. Contact with toilet seat (f)	60.6	90.1	17.1	21.7	19.5	53.6	45.4	0.7	17.2	55.7	51.8	0.1
5. Drink water using a positive person glass for each virus (f)	67.3	98.1	25.8	18.7	18.0	50.7	42.6	0.0	17.0	51.8	55.4	0.0
6. Kissing (f)	49.2	71.9	16.6	15.9	14.8	39.8	38.4	0.0	12.6	38.7	40.4	0.0
7. Mosquito bite (f)	44.6	63.5	17.7	16.7	12.3	31.2	35.1	0.4	10.3	28.8	37.1	0.1
8. Sharing needles (for medical reasons or drug use) (t)	81.6	93.1	90.6	13.5	26.2	97.4	18.3	0.1	23.7	96.6	41.9	0.2
9. Sharing blades or toothbrushes (t)	74.0	82.7	88.6	4.8	23.1	94.0	2.4	0.0	22.0	96.1	29.2	0.3
10. Tattoos or perforation (t)	74.3	83.2	90.3	1.7	23.0	91.6	5.5	0.0	21.6	96.8	26.2	0.0
11. Sharing blood in brotherhood rituals (t)	70.2	78.1	88.0	0.9	21.1	80.8	11.3	0.0	19.5	90.3	20.5	0.0
12. Handshake (f)	75.1	91.1	56.5	45.1	23.9	73.6	44.7	0.4	20.8	67.4	58.7	0.9
13. Breastfeeding (t)	79.4	86.2	93.7	18.9	26.9	82.7	51.5	0.1	22.3	89.2	42.4	0.0
14. Mother to child during pregnancy or labor (t)	83.7	90.9	98.1	21.8	28.5	87.3	54.6	0.1	23.6	89.2	53.2	0.0
Mean proportion	71.4	83.9	68.0	23.7	21.8	71.7	32.4	0.2	19.6	75.4	41.6	0.1
Women at each class, *n* (%)	1136	687 (60.5)	295 (26.0)	154 (13.6)	1161	274 (23.6)	149 (12.8)	738 (63.6)	1161	214 (18.4)	146 (12.6)	801 (69.0)

in a consultation office to ensure privacy and all measures were taken to ensure confidentiality.

Results

The median age of the 1186 participants included was 22 years (Interquartile range = 10), 39.4% women had no formal education or did not finish primary school, and most were housewives (77.9%). The majority of women were cohabiting with a partner (41.1%) and 56.0% had their first sexual intercourse between 15 and 17 years of age. The self-reported prevalence of HIV, HBV and HCV was 6.4%, 0.3% and 0.1%, respectively (Table 2).

Significant differences in sociodemographics, sexual history, and reproductive health characteristics were found regarding knowledge about HIV, HBV and HCV transmission modes. Women in class 1, those with the highest probability of correct answers, had higher levels of education, reported more frequently to be employed or student, had their first sexual intercourse at the age of 15–17, and reported more frequently to have used a condom in their last sexual intercourse. Women's age was not significantly associated with HIV and HBV knowledge, but, younger women were more often represented in class 1 of HCV knowledge. Women that attend the first antenatal visit earlier in pregnancy were significantly more represented in class 1 for HBV and women that presented later in class 3 for HCV (Table 2).

To have heard about HIV/AIDS, Syphilis, Gonorrhoea, Tuberculosis, Hepatitis B or Hepatitis C, was associated with better knowledge about HIV transmission modes. However, only those who have heard about Hepatitis B or Hepatitis C were more represented in class 1 of knowledge about HBV and HCV. Self-reported diagnosis of syphilis, gonorrhoea and tuberculosis were associated with more knowledge of HIV transmission modes. In general, reporting a history of non-sexual risk namely blood transfusion, tattoos and piercings was associated with poorer knowledge about transmission modes (Table 2).

Table 3 shows that agreement between knowledge about HBV and HCV transmission modes was very good (Kappa = 0.731), while the agreement between knowledge about HIV and each of the hepatitis virus was poor.

Discussion

Our results showed high levels of knowledge about transmission modes for HIV among pregnant women accessing antenatal care in Nampula, as 60.5% of women were in class 1 corresponding to the highest mean proportion of correct answers. However, knowledge of transmission modes for HBV and HCV was lower with 23.6% and 18.4%, of women in a similar class 1, respectively. A higher knowledge of HIV was expected since more attention has been paid to this infection, but the low evidenced knowledge about viral hepatitis is of major concern.

The results on knowledge about HIV were similar to previous studies among pregnant women in other African countries (Moses, Chama, Udo, & Omotora, 2009; Ojieabu, Femi-Oyewo, & Eze, 2011). The increased awareness of HIV transmission modes may be due to the structured programs of health education related to HIV implemented in schools and at health facilities across the country and to the establishment of community health education programs by governmental and non-governmental organizations as response to the different national strategic plans (Conselho Nacional de Combate ao SIDA, 2010; Ministério da Saúde, 2004; Conselho Nacional de Combate ao HIV/AIDS, 2004).

Lack of knowledge about HBV was evident in the low frequency of respondents that had ever heard about HBV. This is particularly concerning since HBV, a vaccine-preventable disease, is for many years endemic in Mozambique (Cunha et al., 2007; Stokx et al., 2011). The immunization of children against HBV is already implemented in Mozambique and could provide an opportunity to increase knowledge (Ministério da Saúde, 2001; Viegas et al., 2015). Knowledge about modes of HCV transmission is meagre which can be partially explained by the lower prevalence of HCV infection in the country and lower health education on HCV compared to HIV and HBV (Tiruneh, 2008; Yeung et al., 2014). Also, the fact that the HCV was for long time associated with intravenous drug use, relatively uncommon in Africa, might partially justified the lack of awareness of this infection.

In our study the self-reported diagnosis of HIV, HBV and HCV infection might be underreported considering the estimated prevalence among women in Mozambique (Cunha et al., 2007; Instituto Nacional de Saúde (INS) et al., 2010) and the lack of knowledge about HBV and HCV limited our ability to draw any conclusion on the impact of diagnosis in the knowledge about transmission modes.

We must acknowledge that the recruitment strategy used, excluding women that did not attend antenatal care services, might have resulted in an oversampling of those more aware. Women that do not use health services, may have particularly lower levels of knowledge as we might expect them to have the lowest levels of education and health awareness.

Table 2. Comparison of women in each of the 3- classes of knowledge about HIV, HBV and HCV transmission modes according to sociodemographic characteristics, sexual life, maternal health, previous knowledge of infectious diseases, self-reported infection and history of non-sexual exposures

		Knowledge about transmission modes											
		HIV				HBV				HCV			
	Total sample	Class 1 *n* (%)	Class 2 *n* (%)	Class 3 *n* (%)	*p*-value	Class 1 *n* (%)	Class 2 *n* (%)	Class 3 *n* (%)	*p*-value	Class 1 *n* (%)	Class 2 *n* (%)	Class 3 *n* (%)	*p*-value
	1186	687 (60.5)	295 (26.0)	154 (13.6)		274 (23.6)	149 (12.8)	738 (63.6)		214 (18.4)	146 (12.6)	801 (69.0)	
Sociodemographic Characteristics	*n* (%)	%	%	%		%	%	%		%	%	%	
Age (years)					0.200				0.079				0.011
<18	201 (17.4)	19.0	12.9	22.4		20.5	15.9	16.7		20.7	15.4	17.1	
18–19	201 (17.4)	16.4	20.7	15.8		21.3	17.2	16.3		24.0	20.3	15.3	
20–24	326 (28.2)	28.6	28.6	23.0		25.4	24.1	30.3		19.2	25.2	30.9	
25–29	229 (19.8)	19.9	20.0	19.1		16.0	27.6	19.5		17.3	23.1	19.6	
≥30	198 (17.1)	16.1	17.9	19.7		16.8	15.2	17.2		18.8	16.1	17.1	
Marital status					<0.001				<0.001				<0.001
Single/Divorced /separated/ Widow	130 (11.1)	11.5	8.5	10.7		11.7	6.8	11.1		14.0	7.6	10.8	
Married	227 (19.4)	21.4	13.9	22.7		18.7	33.3	16.9		15.9	36.1	17.4	
Cohabiting with partner	481 (41.1)	37.8	44.9	50.7		42.1	23.1	44.6		40.7	28.5	43.8	
Married traditionally	333 (28.4)	29.2	32.7	16.0		27.5	36.7	27.4		29.4	27.8	28.0	
Education					<0.001				<0.001				<0.001
Without education	243 (20.6)	12.2	27.9	45.5		11.7	12.2	25.7		9.3	18.1	23.9	
Did not finish primary school	221 (18.8)	17.1	21.4	22.7		13.5	13.6	22.0		14.5	11.8	21.3	
Primary school (1st degree)	142 (12.1)	12.1	9.2	16.9		6.2	19.0	12.8		4.7	17.4	13.2	
Primary school (2nd degree)	224 (19.0)	22.2	17.0	7.8		20.8	21.8	17.9		19.2	20.1	18.6	
Secondary School	267 (22.7)	27.1	21.4	5.8		35.4	25.9	17.5		38.3	25.7	18.1	
Pre-University/University	80 (6.8)	9.4	3.1	1.3		12.4	7.5	4.1		14.0	6.9	4.8	
Job situation					<0.001				<0.001				<0.001
Employed	48 (4.1)	5.7	1.7	0.0		5.1	5.4	3.1		5.6	4.9	3.5	
Student	165 (14.1)	17.8	10.9	4.6		24.3	10.9	10.7		26.6	12.6	10.6	
Housewife/Unemployed	914 (77.9)	73.3	82.0	92.7		65.1	81.0	82.6		60.7	80.4	82.5	
Agriculture/Farmer	47 (4.0)	3.2	5.4	2.6		5.5	2.7	3.6		7.0	2.1	3.4	
Sexual history													
Age at 1st sexual intercourse, years					<0.001				<0.001				<0.001
<15	148 (12.6)	12.9	13.6	9.8		10.3	10.8	13.9		9.5	11.0	13.6	
15–17	660 (56.0)	65.5	46.6	33.3		70.6	61.5	49.4		66.8	65.8	51.3	
18–19	24 (2.0)	1.9	2.7	0.7		4.0	2.0	1.2		6.2	1.4	1.1	
≥20	36 (3.1)	3.4	3.1	0.7		4.0	6.8	2.0		4.3	4.8	2.5	
Does not remember	310 (26.3)	16.4	34.0	55.6		11.0	18.9	33.5		13.3	17.1	31.5	
Used condom in the last sexual intercourse	72 (6.1)	7.5	4.7	2.0	0.020	8.4	4.0	5.2	0.093	10.3	4.8	5.3	0.020
Last sexual partner					0.120				0.184				0.185
Husband	1015 (87.3)	85.7	91.0	89.3		86.9	91.3	87.0		84.1	91.7	87.3	
Boyfriend	80 (6.9)	8.0	5.2	4.0		8.0	2.7	7.0		10.3	4.8	6.4	
Friend/ Occasional partner	53 (4.6)	5.2	3.1	4.0		4.7	5.4	4.2		5.1	2.8	4.6	
Rather not answer	15 (1.3)	1.2	0.7	2.7		0.4	0.7	1.8		0.5	0.7	1.7	
Other partner besides last sexual partner in the previous 6 months					0.007[a]				0.012[a]				0.131[a]
No	1006 (87.3)	86.2	87.3	90.7		90.1	80.3	87.5		90.5	83.2	87.4	
Yes	136 (11.8)	13.1	12.3	6.0		9.6	19.7	11.1		9.0	16.8	11.4	
Rather not answer	11 (1.0)	0.7	0.4	3.3		0.4	0.0	1.4		0.5	0.0	1.3	
Reproductive health													
Gestational age at first antenatal care visit					0.756				0.010				0.037
14 weeks or less	90 (7.7)	8.1	6.8	7.8		10.1	9.6	6.2		8.1	9.7	6.9	
15–27 weeks	648 (55.7)	55.8	53.9	58.8		61.2	51.4	54.4		59.8	62.5	53.5	

28 weeks or more	426 (36.6)	36.2	39.2	33.3		28.7	39.0	39.4		32.1	27.8	39.6	
Number of pregnancies					0.077				0.230				0.158
1	336 (28.6)	29.6	26.1	32.0		32.6	29.7	26.8		34.3	26.9	27.9	
2	248 (21.1)	20.5	21.7	19.0		24.2	18.9	20.5		24.9	20.7	19.9	
3	182 (15.5)	17.6	13.2	9.8		14.3	14.9	15.7		13.1	15.2	16.1	
≥4	410 (34.9)	32.3	39.0	39.2		28.9	36.5	36.9		27.7	37.2	36.1	
Ever had an abortion	185 (15.7)	17.4	14.9	10.4	0.087	13.2	17.6	16.3	0.394	14.1	15.9	16.2	0.744
Ever heard about:													
HIV	1118 (94.6)	96.6	91.5	92.2	0.001	96.0	95.3	94.0	0.438	95.8	95.2	94.1	0.587
Hepatitis B	288 (24.4)	29.5	18.1	9.1	<0.001	48.9	34.9	12.1	<0.001	51.6	36.3	14.0	<0.001
Hepatitis C	225 (19.0)	22.2	15.0	9.1	<0.001	42.5	25.0	8.0	<0.001	47.2	29.7	8.8	<0.001
Syphilis	1050 (88.8)	90.4	88.8	81.8	0.010	89.7	87.9	88.5	0.806	89.3	90.4	88.2	0.718
Gonorrhea	1071 (90.5)	93.4	88.8	82.5	<0.001	93.4	89.9	89.4	0.155	92.5	93.2	89.5	0.205
Tuberculosis	1061 (90.1)	93.1	89.2	79.9	<0.001	91.9	91.9	88.8	0.244	92.0	91.7	89.2	0.364
Self-reported infection													
HIV					0.844[a]				0.667[a]				0.336[a]
No	1087 (93.3)	92.8	94.1	94.7		94.5	95.3	92.5		95.8	95.9	92.5	
Yes	75 (6.4)	6.8	5.9	5.3		5.5	4.7	7.1		4.2	4.1	7.2	
Does not know	3 (0.3)	0.4	0.0	0.0		0.0	0.0	0.4		0.0	0.0	0.4	
Hepatitis B					0.599[a]				<0.001[a]				0.006[a]
No	1129 (96.9)	97.2	95.5	97.3		97.4	100.0	96.0		97.7	99.3	96.2	
Yes	4 (0.3)	0.3	0.7	0.0		1.5	0.0	0.0		0.9	0.7	0.1	
Does not know	32 (2.7)	2.5	3.8	2.7		1.1	0.0	4.0		1.4	0.0	3.7	
Hepatitis C					0.326[a]				0.006[a]				0.008[a]
No	1125 (96.8)	97.3	95.2	96.7		97.4	100.0	95.8		97.2	99.3	96.1	
Yes	1 (0.1)	0.1	0.0	0.0		0.4	0.0	0.0		0.0	0.7	0.0	
Does not know	36 (3.1)	2.5	4.8	3.3		2.2	0.0	4.2		2.8	0.0	3.9	
Syphilis					0.001[a]				0.068[a]				0.368[a]
No	1114 (95.6)	94.7	96.9	96.7		97.8	93.3	95.3		97.7	95.2	95.3	
Yes	44 (3.8)	5.2	2.8	0.7		2.2	4.7	4.2		2.3	3.4	4.1	
Does not know	7 (0.6)	0.1	0.3	2.7		0.0	2.0	0.6		0.0	1.4	0.6	
Gonorrhea					0.027[a]				0.039				0.176
No	1127 (97.1)	96.7	98.3	98.0		97.8	93.9	97.5		98.1	94.5	97.3	
Yes	25 (2.2)	2.8	1.4	0		2.2	3.4	1.8		1.9	3.4	1.9	
Does not know	9 (0.8)	0.4	0.3	2.0		0.0	2.7	0.7		0.0	2.1	0.8	
Tuberculosis					0.037[a]				0.398				0.186[a]
No	1149 (98.8)	98.7	99.7	98.0		99.3	98.0	98.7		100.0	97.3	98.7	
Yes	7 (0.6)	1.0	0.0	0.0		0.7	0.7	0.6		0.0	1.4	0.6	
Does not know	7 (0.6)	0.3	0.3	2.0		0.0	1.4	0.7		0.0	1.4	0.6	
History of non-sexual risk													
Blood transfusion					0.059				<0.001				<0.001
No	1013 (85.8)	86.5	82.9	88.9		92.0	91.9	82.2		92.1	92.4	82.6	
Yes	95 (8.1)	8.6	8.5	3.9		7.3	6.8	8.7		7.5	6.2	8.8	
Does not know	72 (6.1)	4.8	8.5	7.2		0.7	1.4	9.1		0.5	1.4	8.6	
Tattoos					0.012[a]				0.019[a]				<0.001
No	965 (81.9)	83.7	81.5	73.9		83.6	77.7	82.3		86.9	72.4	82.4	
Yes	198 (16.8)	15.2	17.8	22.2		16.4	22.3	15.8		13.1	27.6	15.7	
Does not know	15 (1.3)	1.0	0.7	3.9		0.0	0.0	1.9		0.0	0.0	1.9	
Piercing					<0.001[a]				<0.001				<0.001[a]
No	1086 (92.5)	94.1	87.7	95.4		86.4	92.5	94.9		87.7	86.9	94.8	
Yes	70 (6.0)	5.0	10.3	0.7		12.1	7.5	3.3		9.9	13.1	3.5	
Does not know	18 (1.5)	0.9	2.1	3.9		1.5	0.0	1.8		2.4	0.0	1.6	

Note: Missing values range between 3 and 33.
[a]*p*-value for Fisher's Exact Test.

Table 3. Agreement of knowledge about HIV, HBV and HCV transmission modes in the 3- classes latent class model (LCM).

Hepatitis B knowledge	HIV knowledge[a] in Classes 1, 2 and 3 *N* (% of the total)		
Class 1	182 (16.3)	78 (7.0)	2 (0.2)
Class 2	101 (9.0)	36 (3.2)	8 (0.7)
Class 3	392 (35.0)	180 (16.1)	140 (12.5)
Hepatitis C knowledge	**HIV knowledge[b] in Classes 1, 2 and 3 *N* (% of the total)**		
Class 1	140 (12.6)	62 (5.6)	0 (0.0)
Class 2	89 (8.0)	40 (3.6)	15 (1.3)
Class 3	442 (39.7)	191 (17.2)	134 (12.0)
	Hepatitis B knowledge[c] in Classes 1, 2 and 3 *N* (% of the total)		
Class 1	189 (16.6)	46 (4.0)	26 (2.3)
Class 2	12 (1.1)	83 (7.3)	51 (4.5)
Class 3	2 (0.2)	15 (1.3)	716 (62.8)

[a]McNemar test *p*-value: <0.001; Kappa: 0.080.
[b]McNemar test *p*-value: <0.001; Kappa: 0.061.
[c]McNemar test *p*-value: <0.001; Kappa: 0.731.

Conclusion

Among pregnant women knowledge of HIV transmission modes was high but relevant misconceptions were present, and knowledge regarding HBV and HCV transmission modes was much lower. As a higher knowledge level was found among women from high socioeconomic positions, women's empowerment is expected to play a major role in a comprehensive strategy for prevention.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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5.4 Sexual and physical intimate partner violence among women using antenatal care in Nampula, Mozambique (paper IV)

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Sexual and physical intimate partner violence among women using antenatal care in Nampula, Mozambique

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Abstract

The aim was to estimate the prevalence of sexual and physical intimate partner violence (IPV) and its associated factors, in a sample of pregnant women using antenatal care (ANC) in Nampula province - Mozambique. This cross-sectional study was carried out in six health units in Nampula, from February 2013 to January 2014. Overall, 869 participants answered the Conflict Tactics Scale 2. The lifetime and past year prevalence of sexual abuse was 49% and 46%, and of physical abuse was 46% and 44%, respectively. Lifetime and past year sexual abuse was significantly associated with living as a couple, alcohol drinking and having a past diagnosis of gonorrhea. Lifetime and past year physical abuse increased significantly with age and was associated with living as a couple, alcohol drinking and history with syphilis. The prevalence of lifetime and previous year violence among women using ANC was high and similar showing that most women were constantly exposed to IPV. ANC provides a window of opportunity for identifying and acting on violence against women.

Introduction

Intimate partner violence (IPV) is a major public health problem, with one in every three women worldwide ever having experienced sexual or physical IPV.[1] Violence against women is a violation of human rights, it limits the social participation of women, and results in a large range of health consequences, particularly reproductive health.[2-5] Women sexually or physically abused by their partners often present serious clinical conditions (*e.g.*, mental disorders, cardiovascular diseases and hypertension) and societal adverse outcomes such as physical and psychological trauma, limited sexual reproductive control and health care seeking, illegal and unsafe abortions.[1,6,7] Women who have been sexually or physically abused by their partners are twice likely to have an abortion, almost twice likely to experience depression, and, in some World Health Organization (WHO) African regions[1] an increased risk for unintended pregnancy.[8] Beyond the reported consequences on women health, it can be recognized that they are 16% more likely to have a low-birth-weight baby and other adverse pregnancy outcomes compared to women who have not experienced partner violence.[1,6] Although studies on violence against women from Africa are scarce, available data from the WHO shows that the Africa region presents a lifetime prevalence of 36.6% of physical and/or sexual IPV among ever-partnered women.[1,4] In addition, there are African countries where the prevalence against women is much higher, such as South Africa,[9] and Zimbabwe,[10] with estimated prevalence of physical/sexual partner violence of 55.5% and 42.8%, respectively. In Mozambique, there is limited research on IPV against women, particularly in northern part of the country where the current study was carried out. However, a previous study conducted in Maputo, the capital of the country, found that 69.4% of women reported one or more types of violence during the previous year.[11] In a country with high gender inequities, it is expected a high prevalence of violence against women and therefore is of paramount important to implement strategies to monitor the problem in these contexts, to intend to reduce sexual and physical consequences of violence against women.

In developed countries there is evidence that screening IPV during pregnancy might be of great contribution to plan interventions in reproductive health services and therefore to prevent and minimize the impact of such violence.[10,12] Antenatal care can provide an important point of contact where women can be screened for physical and sexual violence and, for those who report IPV, referred to services that can assist them. This could serve as a supplemental screening tool to detect women who have been victims of IPV, these could allow to formulate public health intervention for detection and prevention of violence.[8,13] In the African context, asking women about violence during antenatal care may represent a unique opportunity to reach these women and to assess the magnitude of this issue though in such context we can expect women to delay or omit antenatal care.

Thus, this study aimed to estimate the prevalence of sexual and physical intimate partner violence against women and its associated factors, in a sample of women using antenatal care in Nampula province, in Mozambique.

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Key words: Intimate partner violence; prevalence; pregnant women; reproductive health; antenatal care; Nampula, Mozambique.

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Materials and Methods

Participants and setting

The participants were recruited in six health units in Nampula Province, Mozambique (Hospital Geral de Marrere, Centro de Saúde 25 de Setembro, Centro de Saúde 1º de Maio, Centro de Saúde de Muhala Expansão, Centro de Saúde de Namicopo and Centro de Saúde Hospital

Psiquiátrico), from February 2013 to January 2014. Pregnant women, who visited these primary health care facilities for their first prenatal appointment, were eligible to participate in the study.

Design/procedure

In each health facility, maternal and child health nurses were trained to perform the study procedures, namely to conduct the interviews using a structured questionnaire. After the training, a pilot study was conducted to allow nurses to be familiarized with the questionnaire as well as to harmonize procedures. The sampling procedure consisted in inviting to participate one in every three women attending their first prenatal appointment. 1216 women gave their informed consent among them 946 were or have been in a relationship lasting more than one month and were, therefore, eligible to answer the Conflict Tactics Scale 2 (CTS2).

Of the 946 women, 77 were excluded from the analysis due to missing information on violence measures. Therefore, 869 women were included in the final analysis, among those, 40 women were not at the moment of the interview in a relationship.

Measures

The questionnaire was administered by trained nurses and information was collected on sociodemographic characteristics, tobacco, alcohol and illegal drugs use, sexual behavior (age at the first intercourse, number of sexual partners in the last 6 months), gestational age at the first appointment, history of neonatal deaths, and also diagnosis of sexually transmitted infections.

IPV was assessed using the conflict tactics scales.[14] Women were asked whether they had been victims of various types of IPV. The CTS2 covers psychological aggression, physical assault, sexual coercion, physical assault with injury. The acts may have occurred once, twice, 3 to 5, 6 to 10, 11 to 20 or more than 20 times during the previous year, had not occurred during the previous year but before or never occurred.

Data analyses

For analysis, maternal age was categorized in five categories (>18, 18-20, 21-25, 26-29, ≥30 years), education was categorized according to the Mozambique education system (no education/did not finish primary school, primary school including the first and second degree, secondary school, and pre-university and university degree), marital status was categorized in married or in cohabitation vs. single or separated, and occupation was classified in three categories: housewife or unemployed, employed or farmer, and student.

Information was obtained on the age at the first sexual intercourse and then categorised as ≤14, 15-19, >19 years, having more than one sexual partner in the previous 6 months was recoded in yes or no. Parity was classified as 0, 1, 2, 3, 4 or more, the gestational age at the first appointment was recoded in ≤14 weeks, 15-27 weeks, ≥28 weeks, roughly corresponding to trimesters. For history of neonatal deaths women were categorized as primigravidae, multigravidae with no neonatal deaths and multigravidae with neonatal deaths. Women were also asked about previous diagnosis of HIV, syphilis and gonorrhoea.

In this analysis we only used physical assault acts (*e.g.*, beat up), sexual coercion acts (*e.g.*, threaten to have sex) and injury (*e.g.*, bruises). For the present analysis we considered that women had been abused during the previous year, if they disclosed at least one occurrence of abuse during that period, independently of chronicity.

Statistical analysis

The data entrance was double checked. The Chi-square test was used to compare proportions. Significance level was set at 0.05. The odds ratio (OR) and respective 95% confidence intervals (95% CI) were calculated through logistic regression, with adjustment for the potential confounders. The data analysis was performed using the statistical software SPSS, version 22.

Ethical considerations

Participants were informed of study procedures, benefits and risks of participation, and provided written informed consent for interviews. All study procedures were taken to ensure confidentiality and did not change the health care provision routines. The interviews were conducted in a consultation office, where pregnant women followed all the clinical recommended procedures. Health care and support services were offered for victims of either sexual or physical violence.[15] The study was approved by Ministry of Health of Mozambique and by National Bioethics Committee of Mozambique.

Results

In this sample of 869 pregnant women the lifetime prevalence of IPV sexual abuse was 48.8% and that of physical abuse was 46.0%. During the previous year a similar prevalence was found both for sexual abuse (45.6%) and physical abuse (43.4%). The sample characteristics are presented in Table 1. Briefly, almost two thirds of women were 25 years old or younger, 599 (68.9%) had primary school or less, 678 (78.0%) were housewives or unemployed and 791 (91%) lived as a couple. As for their sexual life, approximately half were 15 to 19 years old in their first sexual intercourse and 735 (84.6%) had only one sexual partner in the previous six months. In terms of reproductive characteristics, 270 (31.1%) were nulliparous and almost 20% (n=173) had had four or more deliveries, 61 (7.0%) had a neonatal death before. As for gestational age at the time of the first prenatal appointment, 63 (7.2%) women were 14 or less weeks, 455 (52.4%) were between 15 to 27 weeks and 334 (38.4%) were 28 or more weeks. Drinking alcohol was reported by 73 (8.4%) women. Previous diagnosis of HIV was reported by 60 (6.9%) women, of syphilis by 35 (4.0%) and of gonorrhoea by 21 (2.4%) women. Sexual and physical IPV occurred in every age group. However, physical violence tended to increase significantly with age after the age of 21-25 years, and this remained after adjusting for education and living in couple (Table 2). More educated women (secondary school and pre-university and university degree) were less likely to have experienced sexual and physical IPV, both during lifetime and in the previous year (Table 2). As well, students were significantly less likely to report both lifetime and past year sexual IPV, this association was not statistically significant for physical IPV. Women living as a couple had approximately twice the odds of reporting sexual IPV both lifetime and past year. This association was not statistically significant for physical IPV. History of alcohol consumption was significantly associated with reporting sexual and physical IPV at any time period. There were no significant differences in the prevalence of sexual abuse and physical violence among women who had one partner compared with those who had more than one partner during the previous six months. Women with their first sexual intercourse after the age of 15 years were significantly less likely to be physically abused both in lifetime and in the previous year, as well as those with their first sexual intercourse after the age of 19 were less likely to report lifetime physical abuse. There was a crude association between multiparity with no deaths and with one or more neonatal deaths and physical abuse, both in lifetime and in the previous year (Table 1), but this association lost significance after adjustments (Table 2). No associations were found for any other reproductive characteristics.

Pregnant women who reported a previous diagnosis of syphilis had twice the odds

Table 1. Prevalence of sexual abuse, physical abuse and injury according to sociodemographics and behavioural characteristics, adverse maternal outcomes and sexually transmitted infections; 2013/2014, Nampula, Mozambique.

		IPV Sexual abuse				IPV Physical abuse and injury			
		Lifetime		Past year		Lifetime		Past year	
	N=869	48.8%		45.6%		46.0%		43.4%	
	N (%)*		OR (95%CI)		OR (95%CI)		OR (95%CI)		OR (95%CI)
Age, years									
<18	148 (17.0)	44.6	1	43.9	1	34.5	1	33.8	1
18-20	207 (23.8)	48.8	1.18 (0.77, 1.81)	45.4	1.06 (0.69, 1.62)	41.1	1.32 (0.85, 2.05)	37.7	1.18 (0.76, 1.84)
21-25	218 (25.1)	49.5	1.22 (0.80, 1.85)	46.8	1.12 (0.74, 1.71)	49.1	1.83 (1.19, 2.82)	46.3	1.69 (1.10, 2.61)
26-29	128 (14.7)	49.2	1.20 (0.75, 1.93)	46.9	1.13 (0.70, 1.81)	51.6	2.02 (1.25, 3.29)	46.9	1.73 (1.06, 2.81)
≥30	154 (17.7)	51.3	1.31 (0.83, 2.06)	45.5	1.06 (0.68, 1.67)	55.2	2.34 (1.47, 3.73)	53.2	2.23 (1.40, 3.55)
Education									
No education/did not finish school	300 (34.5)	54.0	1	50.7	1	51.3	1	48.3	1
Primary school (1st and 2nd level completed)	299 (34.4)	48.5	0.80 (0.58, 1.11)	45.2	0.80 (0.58, 1.11)	47.5	0.86 (0.62, 1.18)	44.8	0.87 (0.63, 1.20)
Secondary School	199 (22.9)	46.2	0.73 (0.51, 1.05)	43.2	0.74 (0.52, 1.06)	38.7	0.60 (0.42, 0.86)	35.7	0.59 (0.41, 0.86)
Pre-University/University	61 (7.0)	29.5	0.36 (0.20, 0.65)	27.9	0.37 (0.21, 0.69)	36.1	0.53 (0.30, 0.94)	36.1	0.60 (0.34, 1.07)
Living as a couple									
No	70 (8.1)	31.4	1	28.6	1	34.3	1	32.9	1
Yes	791 (91.0)	50.1	2.19 (1.30, 3.69)	46.9	2.21 (1.29, 3.78)	47.0	1.70 (1.02, 2.84)	44.2	1.62 (0.97, 2.72)
Occupation									
Housewife/unemployed	678 (78.0)	50.4	1	47.8	1	46.9	1	44.7	1
Employed/Farmer	75 (8.6)	54.7	1.18 (0.73, 1.91)	44.0	0.86 (0.53, 1.39)	48.0	1.04 (0.65, 1.68)	40.0	0.82 (0.51, 1.34)
Student	110 (12.7)	33.6	0.50 (0.33, 0.76)	32.7	0.53 (0.35, 0.81)	39.1	0.73 (0.48, 1.10)	37.3	0.73 (0.49, 1.11)
Alcohol drinking									
No	787 (90.6)	47.5	1	44.3	1	44.1	1	41.4	1
Yes	73 (8.4)	61.6	1.77 (1.09, 2.90)	57.5	1.70 (1.05, 2.76)	65.8	2.43 (1.47, 4.03)	63.0	2.41 (1.47, 3.96)
Age at first sexual intercourse, years									
≤14	187 (21.5)	54.5	1	48.1	1	54.5	1	49.7	1
15-19	444 (51.1)	48.2	0.77 (0.55, 1.09)	46.6	0.94 (0.67, 1.32)	44.1	0.66 (0.47, 0.93)	42.6	0.75 (0.53, 1.06)
>19	32 (3.7)	50.0	0.83 (0.39, 1.76)	43.8	0.84 (0.39, 1.78)	40.6	0.57 (0.27, 1.22)	40.6	0.69 (0.32, 1.48)
More than one sexual partner in the previous six months									
No	735 (84.6)	47.8	1	44.9	1	44.2	1	41.9	1
Yes	118 (13.6)	50.0	1.09 (0.74, 1.61)	44.9	1.01 (0.68, 1.48)	53.4	1.44 (0.98, 2.13)	49.2	1.34 (0.91, 1.98)
Parity									
0	270 (31.1)	47.4	1	45.2	1	37.4	1	35.2	1
1	154 (17.7)	42.2	0.81 (0.54, 1.21)	40.3	0.82 (0.55, 1.22)	40.9	1.16 (0.77, 1.74)	39.6	1.21 (0.80, 1.82)
2	136 (15.7)	47.1	0.99 (0.65, 1.49)	45.6	1.02 (0.67, 1.54)	43.4	1.28 (0.84, 1.95)	41.2	1.29(0.84, 1.97)
3	128 (14.7)	57.8	1.52 (1.00, 2.32)	53.9	1.42 (0.93, 2.16)	53.9	1.96 (1.28, 3.00)	53.2	2.02 (1.32, 3.10)
≥4	173 (19.9)	49.1	1.07 (0.73, 1.57)	42.8	0.91 (0.62, 1.33)	58.4	2.35 (1.59, 3.47)	52.6	2.04 (1.38, 3.02)
Gestational age at the first appointment, weeks									
≤14	63 (7.2)	42.9	1	42.9	1	36.5	1	36.5	1
15-27	455 (52.4)	48.6	1.34 (0.79, 2.28)	45.3	1.19 (0.70, 2.02)	46.8	1.53 (0.89, 2.64)	44.0	1.36 (0.79, 2.35)
≥28	334 (38.4)	49.1	1.29 (0.75, 2.23)	45.5	1.13 (0.66, 1.95)	46.1	1.49 (0.85, 2.59)	43.1	1.32 (0.75, 2.30)
Neonatal deaths									
Primigravidae	237 (27.3)	45.1	1	43.5	1	37.1	1	35.4	1
Multigravidae, no deaths	558 (64.2)	48.6	1.15 (0.85, 1.57)	44.6	1.05 (0.77, 1.42)	47.1	1.51 (1.10, 2.06)	43.7	1.41 (1.03, 1.94)
Multigravidade, ≥1 deaths	61 (7.0)	57.4	1.64 (0.93, 2.89)	55.7	1.64 (0.93, 2.89)	63.9	3.00 (1.67, 5.39)	63.9	3.23 (1.80, 5.80)
Previous HIV diagnosis									
No	794 (91.4)	48.5	1	45.2	1	44.8	1	42.2	1
Yes	60 (6.9)	53.3	1.21 (0.72, 2.05)	51.7	1.29 (0.77, 2.19)	60.0	1.85 (1.08, 3.15)	58.3	1.92 (1.13, 3.26)
Do not know	5 (0.6)								
Previous syphilis diagnosis									
No	814 (93.7)	48.8	1	45.8	1	44.8	1	42.3	1
Yes	35 (4.0)	51.4	1.11 (0.56, 2.19)	42.9	0.89 (0.45, 1.76)	62.9	2.08 (1.03, 4.19)	62.9	2.31 (1.15, 4.65)
Do not know	7 (0.8)								
Previous gonorrhoea diagnosis									
No	823 (94.7)	48.0	1	48.8	1	45.2	1	42.6	1
Yes	21 (2.4)	76.2	3.47 (1.26, 9.55)	71.4	3.08 (1.18, 8.01)	61.9	1.97 (0.81, 4.80)	61.9	2.18 (0.90, 5.33)
Do not know	19 (2.2)								

*Proportions in this column do not add up to 100 due to missing values. IPV, intimate partner violence; OR, odds ratio; CI, confidence interval; HIV, human immunodeficiency virus.

of reporting physical violence in their lifetime (aOR=2.07; 95% IC: 0.99-4.34), and in the previous year (aOR=2.30; 95% IC: 1.10-4.81). Similar findings were found for previous gonorrhoea diagnosis and sexual abuse in lifetime and in the previous year. Although there was a crude significant association with previous HIV diagnosis and sexual abuse, it lost significance after adjusting for age, education and living in couple.

Table 2. Association (Adjusted OR (95% CI) between sexual abuse, physical abuse and injury, sociodemographics and behavioural characteristics, adverse maternal outcomes and sexually transmitted infections; 2013/2014, Nampula, Mozambique.

	IPV Sexual abuse Adjusted OR (95%CI)*		IPV Physical abuse and injury Adjusted OR (95%CI)°	
	Lifetime	Past year	Lifetime	Past year
Age, years				
<18	1	1	1	1
18-20	1.19 (0.77, 1.83)	1.06 (0.69, 1.63)	1.36 (0.87, 2.12)	1.21 (0.77, 1.89)
21-25	1.30 (0.85, 2.00)	1.18 (0.77, 1.82)	1.93 (1.24, 3.00)	1.76 (1.13, 2.73)
26-29	1.11 (0.69, 1.81)	1.03 (0.63, 1.68)	2.00 (1.22, 3.28)	1.70 (1.04, 2.80)
≥30	1.28 (0.80, 2.05)	1.02 (0.64, 1.63)	2.29 (1.42, 3.69)	2.16 (1.34, 3.49)
Education				
No education/did not finish school	1	1	1	1
Primary school (1st and 2nd degree)	0.81 (0.58, 1.11)	0.81 (0.58, 1.11)	0.96 (0.69, 1.34)	0.97 (0.69, 1.35)
Secondary School	0.74 (0.51, 1.06)	0.74 (0.52, 1.07)	0.67 (0.46, 0.98)	0.66 (0.45, 0.97)
Pre-University/University	0.38 (0.21, 0.69)	0.40 (0.22, 0.74)	0.53 (0.30, 0.96)	0.60 (0.33, 1.08)
Living as a couple				
No	1	1	1	1
Yes	2.10 (1.23, 3.60)	2.14 (1.23, 3.72)	1.59 (0.93, 2.71)	1.53 (0.89, 2.63)
Occupation				
Housewife/unemployed	1	1	1	1
Employed/Agriculture/Farmer	1.28 (0.77, 2.13)	0.88 (0.53, 1.46)	0.94 (0.56, 1.57)	0.69 (0.41, 1.18)
Student	0.58 (0.37, 0.92)	0.62 (0.39, 0.99)	1.25 (0.78, 1.99)	1.24 (0.77, 1.99)
Alcohol drinking				
No	1	1	1	1
Yes	2.11 (1.25, 3.56)	1.98 (1.18, 3.33)	2.44 (1.42, 4.20)	2.42 (1.41, 4.09)
Age at first sexual intercourse, years				
≤14	1	1	1	1
15-19	0.85 (0.59, 1.21)	1.04 (0.74, 1.49)	0.57 (0.39, 0.83)	0.68 (0.46, 0.99)
>19	1.02 (0.47, 2.20)	1.02 (0.47, 2.22)	0.41 (0.18, 0.93)	0.52 (0.23, 1.17)
More than one sexual partner in the last six months				
No	1	1	1	1
Yes	1.06 (0.71, 1.58)	0.96 (0.64, 1.44)	1.34 (0.90, 2.01)	1.25 (0.83, 1.87)
Parity				
0	1	1	1	1
1	0.78 (0.52, 1.18)	0.79 (0.52, 1.19)	0.93 (0.59, 1.46)	1.02 (0.65, 1.60)
2	0.99 (0.65, 1.50)	1.02 (0.67, 1.55)	0.91 (0.55, 1.50)	0.94 (0.57, 1.57)
3	1.42 (0.92, 2.20)	1.32 (0.85, 2.04)	1.32 (0.77, 2.26)	1.40 (0.82, 2.41)
≥4	0.92 (0.62, 1.37)	0.77 (0.51, 1.15)	1.43 (0.80, 2.55)	1.18 (0.66, 2.11)
Gestational age at the first appointment, weeks				
≤ 14	1	1	1	1
15-27	1.16 (0.67, 2.01)	1.02 (0.59, 1.76)	1.42 (0.81, 2.50)	1.27 (0.72, 2.22)
≥28	1.20 (0.68, 2.10)	1.04 (0.59, 1.82)	1.25 (0.70, 2.23)	1.11 (0.62, 1.98)
Neonatal deaths				
Primigravidae	1	1	1	1
Multigravidae, no deaths	1.12 (0.82, 1.53)	1.02 (0.75, 1.40)	0.97 (0.64, 1.46)	0.96 (0.63, 1.45)
Multigravidade, ≥1 deaths	1.50 (0.83, 2.70)	1.50 (0.83, 3.80)	1.69 (0.86, 3.33)	1.91 (0.97, 3.76)
Previous HIV diagnosis				
No	1	1	1	1
Yes	1.09 (0.63, 1.88)	1.25 (0.72, 2.16)	1.47 (0.83, 2.58)	1.54 (0.88, 2.71)
Previous syphilis diagnosis				
No	1	1	1	1
Yes	1.18 (0.59, 2.36)	0.93 (0.46, 1.86)	2.07 (0.99, 4.34)	2.30 (1.10, 4.81)
Previous gonorrhoea diagnosis				
No	1	1	1	1
Yes	3.32 (1.15, 9.64)	2.88 (1.04, 7.93)	1.54 (0.59, 4.01)	1.70 (0.65, 4.41)

*Adjusted for education and living in couple; °Adjusted for age, education and living in couple. IPV, intimate partner violence; OR, odds ratio; CI, confidence interval; HIV, human immunodeficiency virus.

Discussion

The lifetime prevalence of sexual and physical IPV was high, with 48.8% of pregnant women experiencing sexual violence and 46.0% physical abuse during their lifetime. A similar prevalence was found both for sexual abuse (45.6%) and physical abuse (43.4%) during the previous year, indicating that abuse is a continuum in life. These high prevalence are consistent with studies conducted worldwide,[16] and in Africa showing an overall prevalence of 20%-70%.[1,4,17] Similar results were found in the neighbouring Zimbabwe where the prevalence was estimated at 46.2% for physical and/or sexual violence.[10] The high prevalence observed in this study of IPV could be related to the patriarchal ideology in traditional societies such as found in Mozambique, where gender roles are distorted to justify violence against women, who are mostly assigned an inferior role to men.[18,19] In addition, the low level of education, young age and low socio-economic status and HIV diagnosis could contribute for higher prevalence of IPV.[4] On the other hand, more educated women were shown to report less violence, supporting that increasing women's education empowers them.

Physical abuse increased with age, being approximately twice as likely in women aged 21 years and over, even after adjusting for education and living with a partner. These results are similar to those of a study in Rwanda, which shows that women aged 26 -34 were more likely to suffer physical abuse,[20] suggesting that males may use violence between partners to control sexual decision making and coercive sex.[21]

Initiating sexual intercourse at age 15 and older seems to be a protective factor, with an inverse relationship between age at the onset of sexual intercourse and the possibility of physical violence, and this trend was maintained when adjusted for education and living with the partner. This finding is consistent with other studies which show the importance of a delay in the onset of sexual intercourse as a protective factor,[22-24] on other hand the young age has been considered as a most factor associated with increased likelihood of IPV.[25]

A significant association was found between exposure to sexual violence and diagnosis of gonorrhoea and also between physical violence and syphilis diagnosis. It is known that IPV is concurrent with a higher risk of sexually transmitted diseases (STD), as well as a reduction in women's use of contraception,[26,27] due to violent behaviour by male partner.[28] However, this result must be read carefully as a small number of women reported a previous diagnosis of these STD.

Multigravidae with one or more stillbirths were at a 3-fold increased risk for physical abuse compared to primigravidae, although after adjustment the strength of the association decreased. These findings seem to show that exposure to physical violence has an impact in pregnancy outcomes. In this study we were not able to determine if reported violence has occurred during pregnancy, however, there is strong evidence from African studies that a history of experiencing abuse in lifetime and in the previous 12 months is significantly associated with IPV in pregnancy or just before pregnancy.[4,29,30]

Strengths and limitations

The Conflict Tactics Scales has been used frequently in many studies since 1972. The CTS is a measurement tool for research program of the family conflicts, it was revised by Murray Straus et al, in 1979. The theoretical basis of the CTS is conflict theory, assuming that conflict is an inevitable part of all human. The CTS2 replaces the matrix format developed for research with military families,[14] and the instrument has been adapted to be applied on researches in Mozambique context.[11]

Although the questionnaires were administered to pregnant women using antenatal care, violence during pregnancy was not assessed. However, a high proportion of women reported sexual and physical abuse during the previous year, and therefore, we may speculate that pregnancy could not stop the violence episodes. Also, we sampled a specific group of women that seek for the antenatal care. It is known that in such contexts, women tend to avoid antenatal care and sometimes deliver at home. Due to its cross-sectional nature, the study cannot provide causal links and there is possible information/disclosure bias. Thus, we might expect a high prevalence of violence in the general population and also an underestimation of the associations found.

Conclusions

This study found a high prevalence of lifetime and past year violence among women using antenatal care in Mozambique. Antenatal care provides a window of opportunity for identifying and acting on violence against women. Therefore, it is necessary to define specific strategies to support women in the context of Mozambique.

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6. DISCUSSION

In this study, we found a high lifetime sexual and physical prevalence IPV with 48.8% of pregnant women experiencing sexual violence and 46% physical. A similar prevalence was found for sexual, 46% and physical abuse 44% during the past year, indicating that abuse is common and is a continuum in life (127). A study conducted in Egypt reported a prevalence of 44.1% of pregnant women studied. Among women who reported violence, 32.6% were sexual and 15.9% physical violence (128). The Africans studies have shown, a high prevalence of IPV against pregnant women, an overall prevalence of 20% - 70% (59, 129).

In this study education showed to play a protection role, more educated women (pre-university and university), were less likely to have experienced sexual abuse and physical violence, during lifetime and in past year. Similar findings were reported with other studies, which besides the level of education, the low-income household were also higher vulnerable to violence perpetrated for their partners (61, 130).

Women with their first sexual intercourse after the age of 15 years were less likely to be sexually or physically abused, compared with those who had their sexual experience before being 14 years old. This finding aligns with other studies that emphasize the importance of delay the onset of sexual intercourse as a protective factor (131, 132).

The latent class analysis for Knowledge regarding modes of transmission HIV, HBV, and HCV, showed a high knowledge for HIV, with 60.5% of pregnant women represented in class 1, where we observed the highest proportion of correct answers and the probability of correct answers than false items. For HBV and HCV in the corresponding criteria for class 1, the percentages were 23.6% and 18.4%, respectively. The knowledge regarding HIV modes of transmission is high compared with the hepatitis virus, which is consistent with the rates

found in pregnant women in other African countries (133, 134). These finding, in the country, could be explained by the massive campaign and structured programs of health education related to HIV prevention measures in schools, at health facilities and in communities across the country (135-137) most of the health educations programs were implemented within the framework of the response to the national strategic plans (138) may have contributed to increase the awareness of HIV modes of transmission and prevention measures.

The knowledge of the modes of transmission of HBV is lower compared with HIV knowledge, which was already evident in the lower frequency of respondents that had ever heard about HBV. This is particularly concerning since HBV, is endemic in the country (35, 98). The inadequate knowledge on HBV transmission modes was also reported in other countries showing the need for interventions that may increase awareness and knowledge on hepatitis B, its modes of transmission, impact on health by community education programs, supplemented by the safe and effective vaccine for women at high risk (139, 140). The immunization of children against HBV could provide an opportunity to intervene by building a consistent awareness program intended to increase the knowledge about HBV infection (86, 141).

Knowledge about modes of HCV transmission is the lowest which can be partially explained by the low prevalence of HCV infection in the country (35, 98), however their evidence that vertical transmission of HCV is a major risk for chronic carries (142). Nevertheless, the fact that the prevalence of anti-HCV is increasing, early awareness programs could warning to start monitoring HCV infection closely, since, among other risk factors, the co-infections with HIV, increase the possibility of HCV vertical transmission up to 19.4% (143) which may cause, in the future, a major concern in public health (97) A global response is required by renewing the primary prevention, vaccine development to prevent vertical transmission (97, 144) this fact brings a challenge to the health authorities to design health policies that include HCV programs as part of awareness campaign aimed at increasing

knowledge of modes of HCV transmission among specific group risk, including women and the general population.

There are few studies conducted and published in Mozambique reporting the co-infection of HIV, HBV, and HCV. One published study was conducted among replacement blood donors, in Maputo Central Hospital (35). In HIV positive donors they found that 8.6% were suffering from a chronic infection with HBV, 2.1% were HBeAg+ and 1.3% had anti-HCV. This data is consistent with other studies conducted in African countries such as Cameroon where was reported a prevalence of 23.7% in people infected with HIV were HBsAg+, amongst those patients 12% also tested positive for HBeAg, which indicates that viral replication was active, and 7.2% were Anti-HCV+, and the co-infected prevalence for both HBV and HCV was 2% (87).

In this study, 30 (9.8%) of HIV individuals were positive for HBsAg, and 5 (1.8%) had a chronic infection. It is known that the high frequency of chronic HBV infection in HIV-infected people, is linked to serious consequences in resource-limited settings, related to the significant increase in morbidity and mortality from liver problems (145, 146) and the negative impact related to the pathophysiology of HIV infection (147), increasing therefore the risk of death in these patients compared to those who are infected with HIV (148, 149).

The prevalence of HBV is higher in Mozambique, for instance, a study on blood donors conducted in Maputo Central Hospital, Maputo City found a global prevalence estimated at 9.3% for HBsAg among blood donors, (35). In another study, conducted in Tete province, found a prevalence of 10.6%, where 90% of participants were men (38). Due to the shared mode of transmission of both viruses (HBV and HIV) co-infection is also common in people infected with HIV in African countries (91), with the advent of ART, the liver disease has been the cause of mortality for people infected with HIV and HBV compared to monoinfected patients with HIV (150). In this study, we found a prevalence of 9.8% in coinfected individuals (HIV + and HBsAg

+) and HBeAg was present in 2.1% HIV-HBV coinfected people. This data is consistent with studies in African countries where co-infection with HBV is present in HIV-infected people varies from 0% to >28.4% (146). Other studies recommend that in African countries, where the base of ART is the Nevirapine, the elevation of transaminases ALT, in HIV positive individuals at baseline or during treatment, should be a sufficient argument for testing the coinfections, mainly for HBV (151).

The HCV coinfection in HIV-infected people is poorly documented in Mozambique, a study conducted, in Maputo, among men and women blood donors found a prevalence of 1.2 and 1.0% of Anti-HCV, respectively (35). In this study, we found a co-infection of 1 (0.2%). Although it is known that HIV+ people, the chance of HCV infection is higher, but evidence from African studies indicate a prevalence of 0.76% for HIV/HCV (91), from the systematic review study conducted in Africa Sub-Saharan, showed a greater predominance of HIV/HBV coinfection compared to HIV/HCV coinfection (92).

The study did not found the simultaneous co-infection by the three viruses. In a study conducted in Abuja, Nigeria, showed a prevalence of 0.7% in HIV-infected people, with HBV and HCV (88). These findings can be explained by the wide variation in the way of transmission of these viruses, depending on regions such as Europe, Asia, Central and South America, where most transmissions occur through injectable drug use (89), this study also found 1.3% of Anti-HCV seroprevalence in HIV-infected individuals. Therefore, this prevalence should be compared to studies conducted in other countries in sub-Saharan Africa where was found a similar prevalence of 1.2% of Anti-HCV positive (90).

With regard to co-infection with HIV/HBV in pregnant women, it does not increase the risk of HIV transmission (115), however it is crucial to study the coinfection among pregnant women, because these women are a significant reservoir for horizontal or perinatal transmission of HBV and the establishment of routine screening to such women could allow an identification of new baby born that require an active or passive immunoprophylaxis at birth,

which may reduce the risk of HBV perinatal transmission in coinfected women that are considered to be of high risk (100, 152). A history of induced abortion, baseline ALT elevated are significantly associated with HBV infection (113).

In Africa, 40% to 60% of people who are chronic carriers of HBV, have been transmitted during pregnancy (116). The WHO recommends that in countries where the prevalence of HBV is higher, pregnant women must be screened for this virus in order to start the treatment recommended in the first quarter of pregnancy (117). In that, the study found HIV/HBsAg+ co-infection with HIV and HBV of 24 (3.6%) in pregnant women. These results are consistent with studies in other African countries, which found HIV/HBV co-infection prevalence of 3.1%, in Kwazulu Natal (100), and 2.3% in Luanda, Angola (9).

This study found HIV/HCV coinfection of 1 (0.2%). Similar studies results, in Tanzania and Angola, showed that MTCT does not play a significant role in HCV transmission (9, 106). The co-infection HIV/HCV, although is not a public health problem in Mozambique, it is known that factors such as the Maternal HIV coinfection, HCV maternal viral load, intrapartum invasive procedures play a great roll on HCV maternal transmission (122, 123). A study conducted in Burkina Faso, the prevalence of HIV/HCV co-infection was 2.38% (124), these results are aligned with the observed in the present study.

Finally, in Sub-Saharan Africa, where is the heart of HIV pandemic, there is a preponderance of HIV and HBV co-infection compared to HIV and HCV, leading to a significant limitation of HCV seroprevalence surveys published, in the region (92). Although screening and treatment for syphilis is part of routine health services, in Sub-Saharan African countries (153-155), there are factors associated with failure of screening during antenatal care such as attending antenatal care in private health facility, previous adverse outcome, not being screened for HIV. The odds of being unscreened increase with decreasing education level (P =0.02) and with decreasing doses of intermittent preventive treatment received for malaria

during pregnancy (P< 0.001), some of the women´s personal characteristics and type of health facility where was received (154). AIDS mortality may have played an important role in the decline of bacterial sexually transmitted infections such as syphilis, but the relatively scale-up of antiretroviral therapy may result in a resurgence of syphilis and other sexually transmitted infections as observed in high-income countries (156).

7. CONCLUSION

The prevalence of intimate partner violence is very high among women in this study. Contact with women in prenatal care provides is a window of opportunity for identifying women who experience violence to undergo screening for sexually transmitted infections. Latent class models (LCM) showed a high knowledge of HIV modes of transmission, but that of HBV and HCV was little known. In this setting, the prevalence of HIV and hepatitis B among pregnant women was very high, syphilis being unexpectedly low. HBV may also have been transmitted horizontally in children, and screening for HBsAg could contribute substantially to avert the negative impact on morbidity and mortality of HIV/HBV coinfected individuals, reinforcing the central role of prenatal care.

8. OUTCOMES

1) This work could contribute to reducing morbidity and mortality among pregnant women and their offspring infected by HIV, HBV, and HCV. It will give a scientific contribution to the country of Mozambique for the possible introduction of protocols for testing HBV and HCV, thereby creating the appropriate protocols for treating these co-morbidities in pregnant women at antenatal care.

2) Contribute to raising other research projects in the area of infectious diseases in the country, mainly on HBV and HCV.

3) Contribute to the promotion of scientific and /or academic meetings.

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